

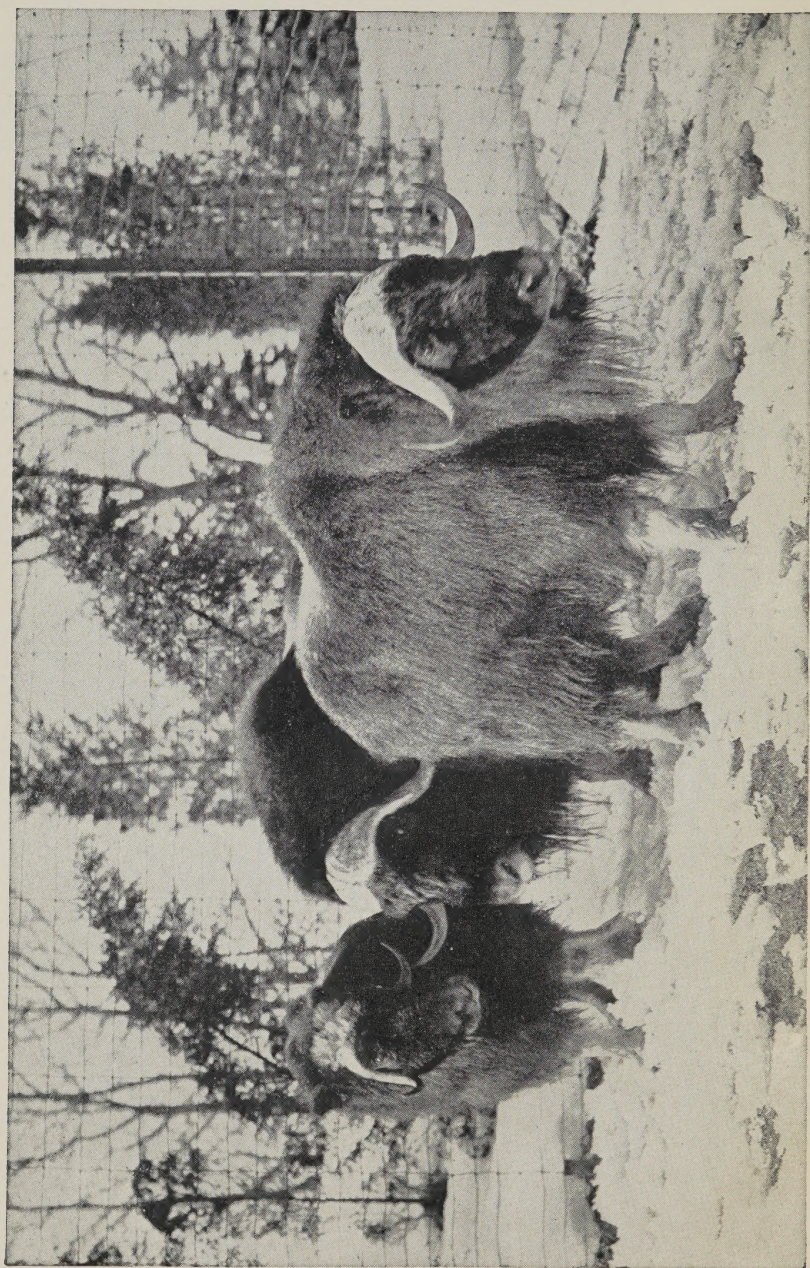


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MUSK-OX—Courtesy of Dr. W. T. Hornaday, U.S. Zoological Society.

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Canada. Reindeer and Musk-ox Industries,
Royal Commission on

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REPORT OF THE ROYAL COMMISSION

APPOINTED BY ORDER-IN-COUNCIL OF DATE MAY 20, 1919

TO INVESTIGATE THE POSSIBILITIES OF THE REINDEER AND MUSK-OX INDUSTRIES

IN THE
ARCTIC AND SUB-ARCTIC REGIONS OF CANADA


JOHN GUNION RUTHERFORD, C.M.G.	-	-	Chairman
JAMES STANLEY McLEAN	-	-	Commissioner
JAMES BERNARD HARKIN	-	-	Commissioner

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1922



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CERTIFIED COPY of a Report of the Committee of the Privy Council,
approved by His Excellency the Governor General
on 20th May, 1919. (P.C. 1079.)

The Committee of the Privy Council have had before them a report, dated May 9, 1919, from the Minister of the Interior, stating as follows:—

Special attention has recently been directed to the potentialities of the Arctic and sub-Arctic regions of Canada as a grazing country. It is represented that in these regions there is an abundant growth of vegetation in the summer, which forms nutritious food for grazing animals in winter as well as summer. It is estimated that there are at least a million square miles of such grazing grounds in Northern Canada. The winter climate of these areas is too severe for ordinary domestic cattle, but musk-ox and reindeer can graze there in the open all the year round. The dimensions of the reindeer industry in Lapland and in Siberia, and the great development of the reindeer herds of Alaska suggest that corresponding development can reasonably be anticipated with respect to Northern Canada. In this connection it is pointed out that herds of barren land caribou, aggregating, it is estimated, twenty or thirty million animals, frequent Northern Canada and that biologically, these animals are practically identical with reindeer.

Vilhjalmur Stefansson, the Arctic explorer, is convinced that the musk-ox can be readily domesticated and has urged that steps be taken in that connection, with the object of developing herds for commercial purposes.

The development of large reindeer and musk-ox herds in Northern Canada will represent a very important addition to the meat production of the Dominion. The development of musk-ox herds will represent not only an addition to the meat production but also to the wool production. The value and attractiveness of reindeer flesh for food purposes is well established. In regard to musk-ox meat, Mr. Stefansson claims it is practically indistinguishable from beef.

In all parts of the world, there is a constant reduction of grazing areas through the development of such areas for field crops, and, in consequence, the meat and wool problems are every year becoming more acute.

The Arctic and sub-Arctic regions of Canada lie too far North to be included in the land suitable for the profitable cultivation of cereals, and therefore may be regarded as permanent grazing areas.

In view of the foregoing, the Minister considers that there are good grounds for believing that the Canadian North may become a great permanent meat and wool producing area, and that a Commission should be appointed for the purpose of making a thorough investigation into the subject from a business and national standpoint, and to report their finding.

The Minister therefore recommends:—

That, under the provisions of Part I of the Inquiries Act, Chapter 104 of the Revised Statutes of Canada, a Commission consisting of:—

John Gunion Rutherford, of Ottawa,
Railway Commissioner;

James Stanley McLean, of Toronto,
Manager, Harris-Abattoir Co.;

James Bernard Harkin, of Ottawa,
Commissioner of Dominion Parks;

and

Vilhjalmur Stefansson;

of which Mr. John Gunion Rutherford shall be Chairman, be appointed for the purpose mentioned;

That the Commission be without remuneration except expenses and be authorized to employ, with the approval of the Governor in Council, such assistance as the members may determine;

That the duration of the Commission be during pleasure, and that it report with the least possible delay upon the feasibility of the propositions mentioned together with recommendations in regard to the best methods to follow to bring about efficient development in case it is found conditions warrant action on the part of the Government.

The Committee concur in the above recommendations and submit the same for approval.

(Sgd.) RODOLPHE BOUDREAU,
Clerk of the Privy Council.

To His Excellency the Governor in Council:

The Report of the Royal Commission, appointed to enquire into and concerning the possibilities of the Canadian Arctic and sub-Arctic for the establishment of reindeer and musk-ox herds:

MAY IT PLEASE YOUR EXCELLENCY:

We, the commissioners appointed by Order in Council of date May 20, 1919, to inquire into and concerning the possibilities of the Canadian Arctic and sub-Arctic for the establishment of reindeer and musk-ox herds, have the honour to present our report to Your Excellency:—

Your commissioners, after several conferences, at which the questions above referred to were fully discussed, decided that it would be advisable to hold a number of public hearings for the purpose of securing and placing on record the evidence of persons having a knowledge of the various matters coming within the scope of the inquiry.

Four hearings were accordingly held at Ottawa, as follows:—

- (1) January 24, 1920.
- (2) February 4 and 5, 1920.
- (3) April 29 and 30, 1920.
- (4) May 12, 1920.

The evidence, as taken at these hearings (Volumes I and II), together with the several submissions, documents and other information obtained during the course of the inquiry, is submitted herewith.

Following is a list of the witnesses who gave evidence at the hearings, in the order of their appearance:—

- (1) Captain George Comer, Commander of whaling and other ships in the Arctic for over fifty years.
- (2) J. J. O'Neill, M.Sc., Ph.D., Geologist with Canadian Arctic Expedition three years in the North.
- (3) W. E. B. Hoare, C.E., Missionary, Church of England; four and a half years in Arctic.
- (4) Right Rev. Bishop Lucas, Missionary, Church of England; twenty-nine years in Arctic and sub-Arctic.
- (5) K. G. Chipman, S.B., Topographer, Canadian Arctic Expedition; five years in Arctic.
- (6) J. R. Cox, M.Sc., Topographer, Canadian Arctic Expedition; three years in Arctic.
- (7) Wm. McInnes, B.C., F.R.S.C., Directing Geologist, Canadian Geological Survey; several years in Canadian sub-Arctic.
- (8) Frits Johansen, Naturalist, Canadian Arctic Expedition; several years in Arctic, including 1906 to 1908 in Greenland.
- (9) Reverend William Peck, Missionary, Church of England; in Arctic from 1876 to 1918.
- (10) D. Jenness, M.Sc., Ethnologist, Canadian Arctic Expedition; six years in Arctic.

REPORT OF THE ROYAL COMMISSION

- (11) Right Rev. Bishop Stringer, Bishop and Missionary of Church of England; twenty-six years in Arctic and sub-Arctic.
- (12) Dr. Alfred Thompson, M.P., represents the Yukon in House of Commons. Lived for many years in Yukon Territory.
- (13) C. C. Parker, Inspector of Indian Agencies, Ontario and Quebec.
- (14) Rev. W. H. Fry, Missionary, Church of England; ten years in Arctic.
- (15) Captain Mack, Superintendent of Transport for Hudson's Bay Company. Spent over eighteen years in Arctic.
- (16) Captain J. E. Bernier, Arctic Explorer, commanded two Canadian Arctic Expeditions.
- (17) Storker T. Storkerson, Commanded Ice Party under Vilhjalmar Stefansson, Canadian Arctic Expedition.
- (18) Frank C. Hennessey, accompanied Captain Bernier on two Canadian Arctic Expeditions.
- (19) A. H. Hawkins, Topographer, engaged in Canadian Government Topographical Survey. Spent some time in northwestern Canada and Canadian sub-Arctic.
- (20) G. E. Herriott, Topographer, Canadian Government Topographical Survey. Spent some time in northwestern Canada and Canadian sub-Arctic.
- (21) G. S. Macdonald, Topographer, Canadian Government Topographical Survey. Spent some time in northwestern Canada and Canadian sub-Arctic.
- (22) S. D. Fawcett, Topographer, Canadian Government Topographical Survey. Spent some time in northwestern Canada and Canadian sub-Arctic.
- (23) H. F. Lambart, Topographer, Canadian Government Topographical Survey. Spent some years in northwestern Canada and Canadian Arctic.
- (24) G. H. Blanchet, Topographer, Canadian Government Topographical Survey. Spent some years in Northwestern Canada and Canadian sub-Arctic.
- (25) Dr. E. M. Kindle, B.A., M.Sc., Ph.D., Palaeontologist, Canadian Arctic Expedition. Three years in Arctic.
- (26) J. B. Craig, B.A., B.Sc., Dominion Land Surveyor, engaged on Canadian Government Survey. Spent some time in Arctic and sub-Arctic.
- (27) B. W. MacLachlan, C.E., Engineer in charge of terminals Hudson Bay Railway, Port Nelson. Spent one and a half years on Hudson bay.
- (28) Major Jas. McEvoy, M.E., Mining Engineer, formerly with Dominion Government Survey. Spent some time in northern British Columbia and Alberta, also in Hudson Bay country.
- (29) Right Rev. Bishop Reeve, Missionary, Church of England. Spent twenty-eight years in Canadian Arctic and sub-Arctic.
- (30) James White, F.R.G.C., Assistant to the Chairman, Canadian Commission of Conservation.
- (31) Rev. W. G. Walton, Missionary, Church of England, stationed at Fort George, James Bay. Thirty-eight years in Ungava.
- (32) Lt.-Col. C. Starnes, Royal Canadian Mounted Police. Spent some years in Yukon, and in the Hudson Bay Company.
- (33) J. Burr Tyrrell, Arctic Explorer, formerly with Geological Survey of Canada. Since 1892 has spent a large portion of his time in Canadian Arctic and sub-Arctic.

REINDEER AND MUSK-OX

- (34) Donald B. MacMillan, D.Sc., Arctic Explorer. Accompanied several United States Arctic Expeditions.
(35) Dr. Rudolph M. Anderson, Geologist, Canadian Arctic Expedition. Five years in Arctic. In command Southern party, Canadian Arctic Expedition, 1913-16.

The evidence as given by these witnesses in the course of the inquiry is extremely interesting, dealing as it does with many different matters having an important bearing on the natural resources of Northern Canada and their possible future development.



Musk-ox Calves—*Courtesy of Dr. W. T. Hornaday, Zoological Society, N.Y.*

Your commissioners, therefore, strongly recommend that this evidence be printed in full as Appendix No. I to this report, in order that the valuable information which it contains may be disseminated as widely as possible among the people of the Dominion.

In addition to the evidence taken at the hearings, written submissions were received from a number of persons conversant with conditions in the Canadian Arctic and sub-Arctic, and in Alaska. Certain of these submissions have been attached as appendices to this report.

On March 12, 1920, Mr. Vilhjalmar Stefansson, having applied for a lease for grazing purposes of a large area in Southern Baffin Island, resigned from the Commission.

REPORT OF THE ROYAL COMMISSION

It will be observed that the Commission held no meetings and took no evidence outside of Ottawa. Your commissioners had contemplated the taking of evidence in Western Canada, and especially at certain points on the Pacific coast, where it was thought probable that more or less direct information would be available as to the work of the United States Government in establishing reindeer herds in Alaska, and the conditions under which that industry was, and is being carried on.

Your commissioners also discussed the advisability of visiting the Yukon Territory and Alaska for the purpose of seeing conditions for themselves, and at the same time securing the testimony of residents possessing actual experience and local knowledge.

These plans were, however, not carried out, inasmuch as owing to pressure of other duties your commissioners were unable to devote to them the time which would have been necessary.

It was found possible to secure in Ottawa most, if not all, of the available evidence bearing upon conditions in the northern portions of the western provinces and our own Arctic and sub-Arctic regions, while your commissioners felt that in so far as Alaska was concerned, the official reports of the United States Government which deal in minute detail with the reindeer situation as it exists there, could very properly be accepted in lieu of evidence.



Rolling Prairie, Herschel Island.

A statement of the facts as summarized from these documents, including extracts from the evidence of Dr. E. W. Nelson, Chief of the United States Bureau of Biological Survey, before the Committee on Appropriations at Washington, D.C., is attached as Appendix No. II to this report.

By the Order in Council, your commissioners were directed to investigate and report as to the feasibility of the development of herds of domesticated reindeer and musk-ox in Northern Canada.

This investigation has naturally involved the study of many other phases of the situation, having a more or less direct bearing upon the main issue. These include not only such matters as vegetation, soil, climate, topography and surface conditions, but also the questions of the conservation and further provision of a food supply for the natives and such whites as may from time to time have to subsist on the country.

REINDEER AND MUSK-OX

Among the matters less directly related to the subject under inquiry, but in regard to which evidence was offered, are those of the protection, not only of the natives themselves, but of the animals on which they subsist, from exploitation and mistreatment by outsiders, this in some cases involving the question of territorial jurisdiction; the habits and customs of the natives and the effects, beneficial or detrimental upon them of contact with the white races, as also the mineral and other natural resources, the development of which may later create an increased demand for local food supplies.

Bearing in mind the limitations of the inquiry, as set forth in the Order in Council, this report deals only with the general aspects of each of the phases of the investigation, as follows:—

- (1) MUSK-OX: (Habitat; Characteristics; Numbers; Domestication; Conservation; Flesh; Fur and Wool.)
- (2) REINDEER: (Possibility of Maintenance; Necessity of Restraint; Grazing and Herding Problems; Experimental Herds; Selection of Localities; Reindeer Meat.)
- (3) CARIBOU: (Habitat; Varieties; Numbers; Menace to Reindeer Herds; Domestication; Caribou Meat; Conservation.)

MUSK-OX

Habitat—

This animal, which evidently at one time existed over the greater portion of the northern half of the North American Continent, has apparently been exterminated, so far as the mainland is concerned, except in that comparatively small region lying north and east of a line extending from Chesterfield inlet on Hudson bay to the western side of Bathurst inlet on Coronation gulf.

There is no exact or even approximate knowledge as to the numbers of musk-ox surviving in the area in question, but from the evidence given, it would appear that they are now comparatively few.

Evidence was readily available from many witnesses as to the existence of musk-ox in this area during recent years, either through these witnesses having seen the animals themselves, their recent tracks, or their fresh skins in the possession of natives.

According to the evidence of Captain George Comer, there are no musk-ox on Melville peninsula, and no reliable evidence was adduced as to their existence on Boothia peninsula.

There is a tradition that a musk-ox was once killed on Baffin island, but they do not now exist on Southampton island or any of the other islands in Hudson bay, or, so far as the evidence indicates, on any of the larger islands lying north of the mainland and south of Lancaster and Melville sounds.

There is, however, ample evidence as to the existence of musk-ox in Melville island, North Devon island, Axel Heiberg island and Ellesmere island while they are also found on the northeast coast of Greenland.

Characteristics—

The musk-ox can apparently sustain life on the natural vegetation found in most parts of the Canadian Arctic.

Witnesses who testified on this point were agreed as to his preference for grass, but it was also shown that where grass was not available, lichen, moss or willow shoots were readily eaten.

Unlike the caribou, the musk-ox is not a migratory animal, preferring to remain indefinitely in areas where food is available. He apparently grazes quietly in much the same way as do domestic cattle, moving only as food conditions render this necessary.

Considerable doubt exists as to the real reason for the comparatively small proportion of calves and young animals found in musk-ox herds, various explanations being advanced by different observers. By some it is held that the female breeds only in alternate years; others attribute this condition to mortality among the calves from wolves, as also to the fact that while the calving season extends well on into the month of June, many calves are dropped shortly after April first, when the weather conditions are most unfavourable for new-born animals.

Numbers—

No exact or even approximate estimate of the number of musk-ox now to be found on the Canadian islands is available, but the evidence would indicate that it is small, and, at least in certain areas, decreasing.

Mr. Storker Storkerson estimated that in 1917 there were four thousand head on Melville island, of which he and his party killed some four hundred for food.

Every year a small party of Greenland Esquimaux cross over to Ellesmere island and kill a comparatively limited number. Professor D. D. MacMillan, who showed perhaps greater familiarity with this part of the north than any other witness, thinks that this is not likely to cause any serious depletion of the musk-ox herds.

It must, however, be borne in mind that the Esquimaux are rapidly adopting the use of firearms and that, as a consequence, the extermination of the musk-ox will, in all probability, speedily follow as has been the case in some localities.

The rapid extermination of the musk-ox is largely due to the fact that unlike the caribou, he does not flee from hunters or other enemies. It is possible for man to approach within a very short distance before the animals take alarm, and when they finally do, they do not run far, but, especially if the hunter is accompanied by dogs, they form a circle or square with the cows and calves inside and the bulls facing outward, and they will thus remain until the whole herd is shot down.

Witnesses agree that the Esquimaux, like the Indian, is naturally improvident in the matter of food supply, and that he will, when opportunity offers, destroy an entire herd without regard to possible future requirements.

Domestication—

The nature of the musk-ox is apparently mild and gentle, although there is evidence that, in the rutting season, the bulls will, as is often the case among domestic cattle, take the offensive when the herd is approached by man. It is also stated that the bulls frequently fight and kill each other.

There is ample proof that the young musk-ox can be readily domesticated, the evidence showing that when cows having young calves are killed, the calves show no fear of man and are easily led away, or will often follow without being led. In many cases they have been taken on board ship and have become pets,

though unfortunately these little animals often fall victims to the Esquimaux dogs which, unless constantly watched, will tear them to pieces.

As will be seen from the submissions of Professor W. T. Hornaday, Curator of the New York Zoological Gardens, which appear as Appendix No. III to this report, musk-ox have been kept in domestication for many years in the unfavourable climate of New York city, while Mr. Stefansson, when in London in 1920, saw two healthy yearling musk-ox females in the Zoological Gardens there.

The evidence goes to show that there would be no insuperable difficulty in effecting the capture and transportation of even full grown musk-ox, though it goes without saying that for purposes of domestication, the younger animals would be greatly preferable.

In the matter of domestication, your commissioners would recommend that a station be established at some carefully chosen, suitable point in the northern islands, and that a small staff of intelligent and competent men be charged with the task of capturing a number of the younger animals, these to be kept under reasonable and proper restraint until they become familiar with and friendly to human beings.

While some expense will be involved, it will be apparent that this will be small as compared with the cost of transporting any considerable number of wild musk-ox from their present habitat to points farther south and more accessible. Later, when suitable arrangements have been made for the maintenance of a herd or herds, possibly on one or other of the islands in Hudson bay, it will be much easier and safer to ship a number of these domesticated animals than it would be to attempt their transportation when newly captured and wild.

In addition to the establishment of a station in one of the northern islands a small number of young musk-ox might be brought down for purposes of domestication, in the event of an experimental reindeer herd being located in the Hudson bay region.

Conservation—

Your commissioners would strongly recommend that all possible steps be taken to safeguard and preserve such musk-ox as still remain on the Canadian mainland. In order to facilitate such conservation, they think it would be advisable to endeavour to ascertain either by aeroplane reconnaissance or otherwise, the approximate numbers and locations of these animals.

In so far as those on the northern islands are concerned, similar steps should also be taken, as although there may be no immediate danger of their extermination or depletion, it is undoubtedly advisable to surround them with proper safeguards and to provide against possible future contingencies, such as, for instance, that of the local Esquimaux becoming possessed of modern firearms.

Flesh of Musk-ox—

All the witnesses were agreed that the flesh of the musk-ox is very nutritious and palatable, comparing most favourably with beef, though more tender and luscious.

It is generally admitted that the flesh of the older bulls is somewhat rank and musky in flavour, and in this connection it will be noted that Captain Munn (see Appendix No. IV) recommends that if domestication is undertaken, a number of the male animals should be castrated.

Quite apart from the meat question, this would be a proper measure, as it would permit of intelligent selection of the best males to be used for breeding purposes.

Milk—

The milk of the musk-ox, while, of course, small in quantity, is said to be of excellent quality.

Fur and Wool—

From a fur standpoint, the skins of the musk-ox are apparently of but little value except for use as robes, but there is no reason to doubt that they would make good leather.

Unlike those of the caribou and the reindeer, the hide of the musk-ox is apparently free from injuries caused by warble flies.

The value of the wool which constitutes the inner coat of the musk-ox is, as yet, problematical. In itself the wool is of fair quality, but though experiments to that end are now in progress, no machinery has so far been perfected which will successfully separate it from the coarse hair of the outer coat, with which it becomes mixed when being shed.

The shedding is a gradual process, the new wool taking the place of the old as this is shed, and there is, therefore, grave doubt as to the practicability of removing the latter until it has been properly replaced by the fresh growth.



Carded Musk-Ox Wool.

In this connection it will be noted that Professor Hornaday states that one of the musk-ox in the New York Zoological Gardens, from which the old wool was combed, died some three weeks later from pneumonia.

It is well known that a sudden change to severe weather will frequently cause serious mortality among sheep that have been recently clipped.

Wolves—

The evidence goes to show that the mature musk-ox, in normal health and condition, does not fear, and it is not attacked by, wolves or other predatory animals, but there is every reason to suppose that, as



Musk-ox Wool Over-socks, Knitted by Madame Bernier—1909.

Courtesy of Captain J. E. Bernier.

in the case of domestic cattle, any young calves which may become separated from the herd, fall a ready prey to the wolves which are always on the lookout for opportunities of this nature.

Flies—

No evidence was secured as to the susceptibility of the musk-ox to flies and other insect pests. The northern islands appear to be largely free from this drawback, but in any case, the hairy coat of the musk-ox is of such a nature as to render him practically immune to such attacks.

Your commissioners are of the opinion that the conservation and domestication of the musk-ox are matters of great domestic importance.

The existence of an animal capable, in these far northern regions, of sustaining life, reproducing its species and laying on flesh, is a matter not to be lightly regarded.

It is more than doubtful if, even after years of painstaking effort, it would be possible to produce from any of our most hardy strains of domestic cattle, an animal which could even approximate the musk-ox in those qualities which so admirably fit him for his environment and for the needs not only of the natives but of the white men who will unquestionably, and that in the near future, be inhabiting our northern possessions.

There is apparently no question as to his adaptability to domestication and your commissioners are convinced that if the matter is gone about in an intelligent and business-like way, any expenditure which may be incurred in his preservation and further development will be amply repaid.



Musk-ox Wool Sock.

Courtesy of V. Stefansson, 1920



Summer—Herschel Island.

REINDEER

Possible Maintenance in Canadian Arctic and sub-Arctic—

There is no reasonable doubt as to the possibility of reindeer being able to live and thrive in most parts of northern Canada.

The experience of the United States authorities in Alaska, that of the Grenfell herds in Newfoundland and Labrador, the presence of the wild caribou in large numbers in many different parts of the north and the ample evidence which has been obtained as to the nature of the different areas and the vegetation and other natural conditions found therein, all indicate that while there may be difficulties in the way, these are neither fundamental nor insuperable.



European Reindeer, Teller, Alaska.

That the wild caribou, which is a member of the same species, with very few points of difference, and these insignificant, can exist in large numbers in the Arctic and sub-Arctic regions of Canada, furnishes practically indisputable evidence as to the suitability of these regions for the maintenance of reindeer herds.

Necessity of Restraint—

In this connection, however, it must not be forgotten that if the reindeer is to retain his quality of domestication, which is, after all, the only argument in his favour as against the caribou, he must of necessity be kept under a measure of restraint.

The caribou, ranging at will from season to season and from place to place, has a distinct advantage not only in the matter of grazing areas, but in being able to avoid insect pests and other conditions which may from time to time interfere with his well being.

Grazing Problems—Parasitical Infestation—

As evidence that the United States Government is beginning to appreciate this phase of the question, it is noteworthy that Dr. E. W. Nelson, Chief of the United States Bureau of Biological Survey, in giving evidence before the House

REINDEER AND MUSK-OX

Committee on Appropriations at Washington in December last, stated that the reindeer herds in Alaska had undergone serious depreciation from various causes, the Bureau of Education, under whose control these herds had been until last year, having made no investigation of the diseases and parasites of the animals, nor any study of the grazing problems connected with the industry.

It had been found that reindeer grazing in the same area for ten years had become very seriously infested with parasites of five or six different kinds, whereas, reindeer herds grazing by themselves over a distant and freer range, were practically free from such parasites.



Reindeer—Just Arrived.

Courtesy of Carl Lomen, Nome, Alaska.

Grazing Unit—

The United States authorities are now studying the range and endeavouring to determine a grazing unit, that is to ascertain how much land, under the forage conditions of that country, one reindeer needs to maintain it for a year.



Vegetation, Herschel Island.

Reindeer Moss—

From a statement regarding "Reindeer in Norway," prepared by Mr. N. Width for the information of the Bureau of Education of the United States Department of the Interior, the following is quoted:—

"The reindeer moss (*Cladonia rangiferinas*) is greyish-white when dried, but with a greenish shade when moist; it takes its nourishment chiefly from the air, avidly absorbing the humidity, which makes it swell and become elastic; in a dry condition, however, it is very brittle. It contains flour and gelatin stuff which makes it nourishing to the reindeer and cattle.

"It grows very slowly. When eaten by the reindeer, which eat only the tops and fine parts of the plants, the moss requires about twenty years to regain its full size. If taken up with the roots, it will hardly grow again."

There would seem to be a considerable divergence of opinion as to how long this reindeer moss or lichen takes to reproduce itself after being closely grazed. Mr. James White, F. R. G. S., Assistant to the Chairman of the Commission of Conservation, states that in Norway the period of recovery is from five to seven years.

The question would seem, however, to be largely one of locality, as the nature of the soil, the amount of precipitation and the extent to which the lichen is eaten down are all factors of importance, while the fact that when in grass producing districts, the reindeer is largely independent of the lichens, is one of great importance in arriving at any decision as to what constitutes a grazing unit.



Vegetation, Herschel Island

Large Herds—Difficulties Arising from Necessity for Restraint—

There are now over 200,000 reindeer in Alaska, all of which, in addition to the tens of thousands which have been killed for meat, have come during the last twenty-eight years from the original importation of 1,280 animals, pur-

chased in the years 1892 to 1902 inclusive. This is a remarkable showing, but it is worthy of note that as the animals increase in number and the herds in size, unforeseen difficulties are encountered and that most of these result from the restraint which it is necessary to impose on the domesticated reindeer as compared with the caribou in its natural state of freedom.

The caribou, in his relation to the reindeer industry, is dealt with fully elsewhere in this report, but at this juncture it should be noted that he unquestionably constitutes the greatest obstacle in the way of establishing herds of domesticated reindeer in Northern Canada, and especially in that portion of the mainland which lies between Hudson bay on the east and the Alaskan boundary on the west.

Much evidence was secured as to the numbers and habits of the wild caribou which inhabit this region, and while this evidence is not as full and complete as it might be, it is quite clear that these animals exist in such numbers and are so widely distributed, that there will be constant danger of their attracting and absorbing any herds of domestic reindeer which may be established in this area.

Establishment of Experimental Herds—

While the difficulties are not to be ignored or minimized, your commissioners are of opinion that there is no doubt as to the advisability of establishing a number of experimental herds in the most suitable locations which can be selected, for the following reasons:—

(1) The recreation and development of such herds will provide reliable and economical food and clothing supplies for the natives, both Esquimaux and Indians.

As will be seen from the evidence submitted, there have been most distressing instances of actual starvation among these people, due to

failure of their usual food supplies. In this connection it would appear to be necessary to provide further safeguards against the possible extermination of the caribou and other wild life, such as had already taken place in certain localities.

(2) To provide future food supplies for white men who may go in to develop or exploit, as the case may be, the mineral and other natural resources of the north.

It may be here pointed out that the food supply furnished by the reindeer herds in Alaska has proved to be a very valuable factor in the development of that country.



Reindeer—The young are very hardy.

Courtesy of Carl Lomen, Nome, Alaska.

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(3) To lay the foundation for a possible future commercial meat industry. From the evidence, as also from certain memoranda submitted with this report, it will be seen that such industries have already been established in Norway and in Alaska.

Your commissioners understand that the Hudson's Bay Reindeer Company is now inaugurating a commercial herd on the concession on Baffin island, granted a year ago to Mr. Vilhjalmar Stefansson. In view, however, of the enormous areas available, there is no reason why many similar enterprises should not be established in Northern Canada.

Further, should this scheme prove abortive or for any reason fail to succeed, much valuable time would be sacrificed, whereas the development by the Government itself, of several small experimental herds, in different carefully selected localities, would largely remove the elements of doubt and uncertainty, and so tend to encourage private enterprise and investment.

As a matter of fact, there is no limit to the possible extension of the industry, if gone about properly and on sound lines. There are, however, certain lessons to be learned from the experience of other countries.

Even in Norway, the home of the reindeer, there is, if we may judge from the evidence of Mr. Storker Storkerson, room for considerable improvement, at least in the matter of winter feeding.



Original Grenfell Herd—Imported from Norway.

Courtesy of Grenfell Ass.

In Alaska, as has already been pointed out, over-confidence and neglect of the first principles of animal husbandry, have produced a crop of parasitic and other troubles, which it will be our duty to avoid.

Dr. Grenfell's experience in Newfoundland with its discouraging sequel at Lobster bay, as also the ill-starred attempt to locate a herd of reindeer at Fort Smith, all point to the necessity for the employment of caution, care and foresight, as well as sound practical knowledge in any action which may be taken. (See Appendices No. V, No. VI, and No. VII.)

Selection of Localities—

The evidence indicates that great care must be exercised in selecting locations for any herds which it may be decided to establish.

Vegetation—

In the first place, the district must be one in which the vegetation is of such a nature, and in such quantity, as to provide ample sustenance for the herd. The evidence of those witnesses best qualified to express an opinion, is to the effect that the reindeer and his relative the caribou, readily eat both grass and lichen, having apparently no special predilection for either, but utilizing whichever is most prevalent in the locality in which they may happen to be.



Summer Vegetation, Bernard Harbour, N.W.T.

Herd—

The nature of the country must be such as will permit of effective herd control. The evidence indicates that in some districts man, either on foot or on horseback, would find it quite impossible, especially during the summer season, to travel over the surface in any given direction at such a speed as to permit of effective herding.

Flies—

While the evidence on this point is somewhat conflicting, it has been fairly well established that during the summer season, when the flies are bad, both reindeer and caribou endeavour to reach the seashore or betake themselves to higher and more open lands, where they have the advantage of such breezes as may offer.

Natural Shelter—

It is claimed by some witnesses that there is no tendency on the part of either the reindeer or the caribou to seek shelter in extreme weather. Be this as it may, the fact remains that the woodland caribou are much larger than those of the so-called barren land variety, their carcasses dressing out at from two hundred to two hundred and seventy pounds, while the carcasses of the barren land caribou do not weigh over one hundred and fifty pounds.

Of the barren land caribou, those herds which spend at least a portion of the year in the wooded country, are much larger and stronger than those found in the northern islands, the extreme example being the Peary caribou, found in Northern Grant island and Axel Heiberg island, which is a small light animal, very slim and with fragile bones, though there is no lack of lime in that area.

It is, therefore, reasonable to suppose that the existence of winter shelter would be an advantage.

Danger from Wild Caribou—

This is unquestionably the most important point to be considered in selecting the locations for reindeer herds, especially on the mainland.

Many witnesses readily admitted the danger of the absorption of a small herd of reindeer by a large herd of wild caribou, but the danger is by no means confined to the large caribou herds, as a small band of wild caribou would be quite as likely to lead off any reindeer not under close and constant observation and control.



Natural Shelter and Vegetation, Herschel Island, N.W.T.

Fencing—

In most parts of the north country, fencing would be a matter of great difficulty on account of frost conditions, while in any case it would add enormously to the cost of operation.

The difficulties in connection with the effective herding of reindeer have already been referred to. It is therefore plain that the selection of a location for a reindeer herd on the mainland will necessitate a very careful study of the area under consideration, so as to utilize to the best possible advantage, as means of control, any suitable valleys or other special topographical features which may be available.

Special Localities—

While your commissioners do not feel that they would be justified in making any definite recommendations as to localities in which experimental reindeer herds should be placed, they desire to call attention to certain facts brought out in the evidence which bear directly upon this phase of the question.

Islands in Hudson Bay—

On January 27, 1920, your commissioners asked that, as a precautionary measure, certain islands in Hudson bay, namely, Southampton island, Coats island and Mansell island, should be reserved for the purpose of providing grazing grounds for reindeer and musk-ox and this request was granted by Order in Council of date March 10, 1920. (P.C. 522.)

It would appear that in some respects, the most desirable of these islands is Southampton island, which from all the information which your commissioners have been able to obtain, is suitable in every respect except that it is too large, being about equal in size to Ireland.

There are also on it at present several herds of wild caribou and a number of wolves.

These conditions would involve a considerable expenditure for fencing, as without fences it would be quite impossible to keep the reindeer from joining the wild caribou, and there would also be constant danger from wolves.

There is a further danger of the ice setting solid on Rows Welcome, thus giving access to the mainland, which, for various reasons, would be undesirable.

Coats island, which lies southeast of Southampton island, is about sixty miles long and twenty miles wide. According to Captain H. Toke Munn, whose submissions, attached as Appendix No. IV to this report will be found well worthy of perusal, the food on this island is excellent, there are no wolves, and on the north side there are plenty of walrus available for food for any Esquimaux that might be employed as herders.

There are some barren land caribou on this island which Captain Munn recommends should be reduced to a small number, and the young caught and put in with the reindeer.

The only animals which might prey on the reindeer on Coats island are the polar bears, which are numerous. It is said however, that these animals seldom succeed in catching caribou, while they themselves are easily killed and will soon abandon a place where they are frequently hunted.

There is a tradition that in one season many years ago, the caribou on Coats and Mansell islands were killed off by weather conditions, a heavy rain followed by freezing creating a hard crust through which the animals were unable to reach the food underneath.

This, however, is a condition which might occasionally be met with on any of the lands in or tributary to Hudson bay, and one against which it would be possible to provide, at least in the case of a small reindeer herd.

Coats island is deficient in harbour facilities, but this should not prove a serious drawback, at least during the earlier stages of the experiment.

Your commissioners understand from the evidence, that Mansell island is very rugged and short of vegetation, although it might possibly, on further investigation, be found well adapted for reindeer.

Ungava—

The whole of Ungava would appear to be well suited for reindeer. There is an ample supply of suitable vegetation and in the northern and western parts of the peninsula there are very few caribou. This latter condition has existed since 1883, when, as a result of forest fires, they disappeared from that part of the country. As a consequence, probably of this disappearance, the number of wolves is also insignificant.

The natives, both Indians and Esquimaux, on the eastern shores of Hudson bay suffer, perhaps to a greater extent than any others, from periodical scarcity of food, as also from lack of deer skins with which to make suitable clothing. It would therefore seem highly desirable that one or more herds of reindeer should be established on this coast.

Attention is called to the evidence of the Reverend W. G. Walton, Missionary of the Church of England, stationed on James bay, as also to the special statement which he has prepared at the request of the Commission, and which is attached as Appendix No. VIII. It will be noted that he has no hesitation in stating that any tame reindeer located there would be quite safe from attack by either Indians or Esquimaux.

The Reverend William Peck, Missionary of the Church of England in Baffin's island and Ungava from 1876 to 1918, in his evidence before the Commission, corroborated the statements of other witnesses as to the suitability of Ungava both in the matter of vegetation and the absence of caribou, and was strongly of opinion that the establishment of reindeer herds would be of great assistance to the natives, both Esquimaux and Indians.

As Ungava forms part of the province of Quebec, the co-operation of the provincial authorities would be necessary in arranging for the establishment of experimental herds on that peninsula.

West Coast of Hudson Bay—

From the evidence of Mr. J. H. D. Tyrrell, Colonel Starnes, Mr. D. W. MacLachlan, C.E., and others, it is evident that the area comprising a strip of land about thirty-five miles wide on the west coast of Hudson bay and to the north of Fort Nelson, is but ill adapted to the maintenance of domesticated reindeer herds. While in the southern part of this area, there is a certain amount of rough food, the surface conditions are such as to render effective herding out of the question. The northern part, between Fort Churchill and Wager inlet, is said to be so barren and rocky as to furnish but little feed of any kind.

Arctic Coast—

Your commissioners were fortunate in being able to secure much valuable information as to the potentialities, from a reindeer point of view, of the territory lying within about thirty miles of the Arctic coast, between the International Boundary on the west, and Kent peninsula on the east. As will be seen from the evidence accompanying this report (Appendix No. I) the witnesses familiar with this coast were practically unanimous in the opinion that while some localities are better than others, by far the greater part of this area is eminently adapted for the maintenance of reindeer.

It could, in fact, scarcely be otherwise, as the vegetation and other conditions are almost exactly similar to those which prevail in those portions of Alaska where the reindeer industry has proved most successful.

All were, however, agreed that there would be more or less difficulty in keeping the reindeer separate from the wild caribou, which, in herds varying greatly in size, constantly frequent this region.

There is a definite migration of caribou northward in March, April and May, in which the animals cross the ice to Victoria island, either at Dolphin and Union strait or at Dease strait to the east of Coronation gulf.

As they do not move in a body, but in small detachments, the migrations occupy considerable periods, and it will be evident that great trouble would be experienced in keeping reindeer herds clear of these migratory bands.

REINDEER AND MUSK-OX

The situation might be simplified to some extent by the use of cow ponies in herding. Some witnesses appeared to think that horses could not withstand the severe winter conditions of the Arctic regions, but the evidence of Messrs. Lambart and Craig, as also that of the Reverend W. H. Fry, would indicate that with proper treatment, there could be but little difficulty on that score.

As it is evident that the success of any reindeer herds which might be established along this coast will depend almost entirely on efficient herding, your commissioners are of opinion that the possibility of utilizing horses in this work should be thoroughly investigated.

All horses taken north should be of the hardiest possible strains. The evidence would indicate that in most of the area under discussion, the footing would be sufficiently good to permit of the use of horses.

Interior of Yukon Territory—

From the evidence of Dr. Alfred Thompson, M.P., Bishop Stringer and others, there can be no doubt as to the possibility of reindeer finding ample vegetation of a suitable character in the interior of the Yukon Territory.

MacKenzie Basin—

The evidence of Bishop Reeve, Bishop Lucas, Dr. D. H. Kindle, Mr. S. D. Fawcett, and other witnesses familiar with the Mackenzie basin, goes to show that the same is true of this area, and of the territory tributary to the Mackenzie river.

Reindeer Meat—

As stated further on in this report, much valuable evidence was secured by your commissioners as to the undoubted nutritive value and palatability of



Meat shipped "veal dressed" (with hides on). Best method when properly frozen.

Courtesy of Carl Lomen, Nome, Alaska.

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caribou meat. From evidence, both direct and indirect, it was clearly shown that there is practically no difference between the meat of the reindeer and that of the caribou.

Information secured by Mr. Stefansson was to the effect that in Norway and Sweden there was developed during the war period an excellent market for reindeer meat, and that as the people became accustomed to its use the price increased with the growing demand, until it slightly exceeded those of both beef and mutton.

That it also finds a market in North America is shown by the following excerpt from a most comprehensive memorandum furnished by Dr. James White, F.R.C.S., from which more extensive quotations would have been made but for the fact that before it reached the Commission, much of the information which it contains had already been secured and compiled:—

“During 1919, about 1,000 reindeer carcasses, averaging 150 pounds each, were shipped from Nome to Seattle, making an aggregate of 150,000 pounds, or 75 tons. This meat sold for about 28 cents, f.o.b. Seattle, making the total value of the trade about \$42,000.

“The carcasses are shipped with the hides on, the hides being valued at about \$5 each.

“These shipments were made by the Lomen Company which owns about 16,000 reindeer.

“The average value of reindeer in Alaska is about \$25 per head.”

Reindeer Skin—

The skin of the reindeer which, when properly dressed, is very soft and pliable, is the principal clothing material in use among the Lapps of Northern Europe and their kinsmen in Siberia. It is almost solely used for clothing purposes by those natives of Alaska who have reindeer, as also largely by the white inhabitants of that territory. The Esquimaux of Northern Canada use instead the skin of the caribou which is, of course, practically identical. In Ungava, owing to the disappearance of the caribou, the natives have been forced to wear cotton clothing, and as a consequence, endure great physical suffering and are very liable to disease.

Milk—

Although the yield from the domestic reindeer is small, the milk is richer than that of the cow, and among the Lapps reindeer milk and its various products form an important part of the diet.

CARIBOU

Habitat—

All the evidence relating to the vast interior territory, beginning in the south at about township 60 in the Prairie Provinces, extending to within about thirty miles of the Arctic coast, and from a short distance west of the coast of Hudson bay on the east, to the Alaskan boundary on the west, indicates that this region is tenanted by vast numbers of wild caribou, principally of the Barren land variety, which migrate annually over practically the same routes.

In Newfoundland, as well as in all parts of Canada which, while not comprised in the area specifically defined above, yet furnish a congenial habitat, caribou are to be found, but these, though differing widely from each other in minor points, are mostly of the Woodland variety.

Varieties—

Zoologists have somewhat arbitrarily, but by no means unanimously, divided the caribou of North America into some eleven different groups, of which six are classed as "Barren Land" and five as "Woodland" caribou.

The authorities appear to be far from agreement in the matter of classification, and your commissioners have therefore thought it best to refrain entirely from the use of the scientific names which have been bestowed on the various types, and to refer to them only in general terms as "Woodland" and "Barren Land" caribou.

The Zoologists are apparently agreed that all the differing varieties of caribou are capable of interbreeding, and as there are no artificial restraints and but few hard and fast natural barriers, it is not unreasonable to suppose that as in the case of many other animals, the more

pronounced points of difference between the various types have had their origin in local conditions, and that many of the minor variations have resulted from the invasions of males from other herds.

In the reports of school teachers and others who are in charge of reindeer herds in Alaska, appear from time to time, reference to wild male caribou joining the herds in the breeding season and leaving progeny larger and stronger than that from the domestic sires.

Similar exchanges undoubtedly occur between herds of wild caribou, possibly differing somewhat widely in size, form or other characteristics, with the result that intermediate types are produced, leading to more or less confusion in classification.

Ignoring the finer distinctions, therefore, it may be generally accepted for the purposes of this report, that in the country north of the 55th parallel of latitude and east of the Mackenzie river, the herds seem to be comprised almost altogether of Barren Land caribou.

On the other hand, in the territory lying south of the 55th parallel, as also in northern British Columbia, and the southern half of the Yukon Territory, the Woodland caribou seem to be in possession.



Caribou near Carey Lake, N.W.T.

Photo by J. B. Tyrrell.

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The Woodland caribou in these Western areas, of which there are said to be two varieties, are of large size and it is from this district or the adjoining portion of Alaska that the United States Government proposes to secure the males to be used in raising the standard of its reindeer herds.

In the northern Yukon, the Barren Land caribou are again in evidence, although it is claimed that the variety there found differs in several respects from those dwelling to the east of the Mackenzie river.

One witness suggested the existence in the territory lying south and southwest of Hudson bay, of another caribou combining the characteristics of the Woodland and Barren Land varieties. While there was lack of definite information on the point, it is for reasons given above, quite within the range of possibility that in this borderland area, such a type may have been evolved.

Numbers—

Many witnesses gave valuable information regarding the large interior region, but none had actually seen any of the reputedly extraordinary masses of caribou, though the evidence of Mr. J. B. Tyrrell as to the comparatively large herd seen by him at Carey lake in 1893 is not only most interesting, but, of course, absolutely authentic.



Caribou near Carey Lake, N.W.T.

Photo by J. B. Tyrrell.

From time to time the northern patrols of the Royal Northwest Mounted Police have reported the existence of enormous herds of caribou. The following extract is from the report of Inspector Pelletier, who in 1908 commanded a patrol which travelled from Fort Saskatchewan, Alberta, to Chesterfield Inlet and Fullerton on Hudson bay, and returned to Regina.

While on Artillery lake, on or about July 20 of that year, he states that:—

“At the south end of Artillery lake, countless deer were seen; the bucks and does seemed to belong to separate herds. They were crossing and recrossing at that point where the lake is quite narrow, ranging from one quarter of a mile to a mile and a half in width. For a distance of about two or three miles the hills were covered with them, and the water was bridged in two or three different places at a time. This might appear to be exaggerated; I would never have believed there were so many

deer in the North, only now that I have seen them, I must. The natives that we met at that place told us that what we had seen was not the main herd, but part of it; that the main herd was a few miles up the lake on the west shore; that they had just been there in their canoes the previous day. If what we had seen was not the main herd, but part of it, I wonder how large the main herd could be. As soon as the lake widened to two or three miles, we lost sight of the deer, and one we sighted after on the beach appeared greatly worried by flies, frequently taking a run in the water and making as much splashing as possible."

Again, on December 15, 1917, Inspector Anderson, of the Royal Northwest Mounted Police, writing from Fort Fitzgerald, east of the Slave river, to Dr. E. M. Kindle, states:—

"There is nothing new here except the caribou. They are within forty miles of this place in tens of thousands, and the natives are getting numbers of animals and will therefore have plenty to eat this winter. The deer (caribou) are passing north, coming from the southeast, most likely from Fond du Lac on Lake Athabaska. They could not cross there on account of late frosts, and swung around towards Great Slave lake. They say the animals are scattered over hundred of miles and literally in millions; the further east one goes, so they say, the more there are, and the buffalo on the plains in the long ago is not a patch on this for numbers. Eventually they land in the barren grounds where nobody bothers them until they take another trek. I sent the sergeant out on a patrol to see, and he reports that the snow is tramped down for miles as close as ice by the animals' feet where they have passed in great numbers. It is most wonderful."

In view of the lack of exact information, not only as to the numbers but the whereabouts from time to time of those large bands of caribou, your commissioners would strongly recommend that steps be taken, either by the use of aeroplanes or by such other means as may be considered best, to secure authentic data on those points.

Absorption of Reindeer Herds by Caribou—

It will be evident that in view of the conditions as described, it will be impossible to favourably consider either the establishment, at least without adequate fencing, the cost of which would be practically prohibitive, of experimental reindeer herds, or the granting of leases or other concessions for the raising of reindeer, anywhere within the interior area.

Not only would it be physically impossible for the lessees to keep reindeer under such control as would prevent their mingling with the wild caribou, but, leaving aside the possibility of wilful and deliberate exploitation, the existence of leased areas, even if fenced, in the natural haunts of these animals and the consequent interference with their freedom of movement, would be likely to prove a serious detriment to what is, even as matters now stand, a very valuable national asset, and one the value of which could be greatly increased under a definite policy of conservation and development.

Domestication—

There is no reason to doubt that given proper facilities for restraint, and with intelligent handling, young wild caribou would readily yield to domestication.

It is, on the other hand, equally beyond question, that while the wild caribou is doubtless susceptible to domestication, he will not become tame, nor will the domestic reindeer remain tame, unless kept under close and effective control.

In this connection it is worthy of note that of the reindeer handed over by Dr. Grenfell in 1919 to the Department of Indian Affairs, and since maintained under fence at Lobster bay, on the north shore of the Gulf of St. Lawrence, a number have escaped, while the remainder, as a consequence of inefficient herding and lack of skilful handling, have largely reverted to a wild condition.

Attention is drawn to the report of Mr. C. C. Parker, Inspector of Indian Agencies, of date November 15, 1919, which is attached as Appendix No. VI.

Caribou Meat—

The witnesses who appeared before the Commission were, with one exception, unanimous in the opinion that the meat of the wild caribou is both nutritious and palatable.

All were agreed that in the late winter, spring and early summer, this meat is neither very appetizing nor nutritious, the animals being then thin and out of condition, but they stated without hesitation that in the fall and early winter, when the animals were fat after the summer's grazing, the flesh is an excellent food, many claiming it is superior to beef, mutton or other domestic meats.

Conservation—

The evidence of various witnesses would appear to indicate the necessity for increasingly stringent regulations governing the slaughter of wild caribou.

The statements of Captain Joseph F. Bernard, of Tignish, P.E.I., after a four years' voyage into Coronation gulf and the Victoria island region in his schooner *Teddy Bear*, as taken by Dr. R. M. Anderson, and forming part of the submissions of the latter (see Appendix No. IX), is very valuable as showing the tremendous and often unnecessary slaughter of caribou by natives at different points on the Arctic coast.

Captain Bernard states that if the slaughter which has taken place in the last four years, since the natives have been armed with rifles as a result of the establishment of trading posts on Coronation gulf, continues, there will be no caribou left in that region within ten years.

The Reverend W. H. Fry, Anglican Missionary in the north for ten years, six of which were spent on the Arctic coast, was strongly of the opinion that something should be done to regulate the killing of the wild caribou. He states that every spring, just before the young are born, large numbers of caribou are slaughtered by the Esquimaux. Much of this slaughter takes place on the tundra between Herschel island and the mountains which run obliquely to the coast, this being the breeding ground of the caribou in that region.

Most of the animals killed are pregnant females, as the bucks do not accompany the spring migration in any numbers.

Mr. Fry states that there is no necessity for the killing of these caribou, as there is plenty of other food available at that season of the year. He is of opinion that if the Government were to forbid the spring shooting of female caribou, the Esquimaux would take it in good part, as the wiser men among them realize that it is foolish and speak of it in that sense.

There is no doubt that not only the Esquimaux and the Indian, but many white men as well, are in the habit of killing caribou in large numbers and at all seasons of the year, without regard to the first principles of wild life conservation.

As in the case of the musk-ox, already referred to, the acquisition by the natives of fire arms instead of the bows and arrows which they formerly used, is responsible for the tremendous increase in the number of animals annually, and in many cases, wastefully destroyed.

The evidence secured by your commissioners is not of such a nature as to warrant them in reaching any definite conclusion as to the extent to which the wild caribou herds have been reduced in numbers from this and other causes. The statements of many witnesses, however, convey the impression that in a number of localities, the herds have, during recent years, been seriously depleted, and in some cases practically exterminated. This applies to a large portion of the Arctic coast both east and west of Herschel island, to the Mackenzie basin, to practically all the territory immediately tributary to Hudson bay and to that which now forms the northern part of the three Prairie Provinces.

Wolves and Wolverines—

It is unfortunately beyond question that wolves and wolverines, especially the former, exact a constant heavy toll from the caribou herds.

Apparently wherever the caribou exists, wolves are also found, and the evidence of Mr. J. B. Tyrrell, who perhaps to a greater extent than any other witness has had opportunities of observing the wild life of the large central region, furnished most valuable information as to the manner in which the wolves secure their prey by establishing their dens in close proximity to the various river crossings used by the migrating caribou. He, at the same time, indicated certain methods by which the losses from this cause could be largely prevented. He referred to the wolverine as a most dangerous, though perhaps not so general a menace to caribou life.

ESQUIMAUX AS HERDERS.

Much conflicting evidence was given as to the likelihood of the Esquimaux or the Indians developing into efficient herders. Most of the witnesses who have had an opportunity of studying the Esquimaux at close range, appeared to think that if properly trained by Lapp experts, they would develop into excellent herders.

This view is of course strongly supported by the experience of those in charge of the reindeer enterprise in Alaska, where the Esquimaux have clearly demonstrated their adaptability in this regard.

Mr. D. Jenness, Ethnologist, who spent one year in Alaska and two on Coronation gulf with the Canadian Arctic Expedition, was not sure that it would be at all an easy task to convert the native Esquimaux into efficient herders. While intelligent and trustworthy, they have been for generations hunters and fishermen, and as long as game, fish and seal are plentiful they will not, in his opinion, turn away from that life for the more humdrum life of herding. If, however, game became scarce, they would, he thought, develop into herders as they had done in Alaska.

Professor D. B. MacMillan also stated frankly that he could not imagine two or three Esquimaux guarding a herd of musk-ox or caribou, as such an occupation was entirely at variance with their usual mode of life. As he knew them in the far north, their summers were spent in hunting and laying up provisions for the winter, while the winter itself was a season of pastime, spent in visiting and other forms of Arctic enjoyment.

It was generally agreed, however, that the Esquimaux was more likely than the Indian to become a herder, but several of the most experienced missionaries thought that the latter could also be trained, though it would take some time and effort to make him reliable and efficient.

Your commissioners desire to emphasize the importance of securing the services of skilled Lapp herders to take charge of any reindeer herds which may be established, and to act as instructors to either white men or natives who may later be entrusted with the care of reindeer.



Method of Packing Reindeer—Alaska.

Courtesy of Carl Lomen, Nome, Alaska.

Lapps as Herders—

In this connection your commissioners desire to call attention to Appendix No. XI to this report, in which are embodied excerpts from letters written by Dr. Grenfell to Mr. Jose Machado, Secretary of the Canadian Branch of the International Grenfell Association, and by Mr. W. A. Kjellman, of Los Angeles, California, to the National Parks Branch of the Department of the Interior, suggesting that immediate steps be taken by the Canadian authorities to secure as settlers in the Canadian Labrador a considerable number of Lapps, who, owing to the reindeer ground in Norway and Sweden being now fully taken up, are debarred from extending the industry in these countries.

Your commissioners are of opinion that the movement of these people from Lapland to Canada at the present juncture would be most desirable from every point of view, and would strongly urge that the matter be given immediate attention.

If, as is suggested, they could be induced to bring with them considerable numbers of reindeer, they would be of the greatest possible assistance to the Government in carrying out the policy recommended in this report of planting experimental herds in a number of different localities.

While it might possibly be found best to let them first settle together in suitable territory on the Canadian Labrador, so as to give them a racial home and rallying point, it must be remembered that their instincts are nomadic, and that, therefore, there would probably be but little difficulty in arranging with them to act as herders for the Government either on salary or on a share basis, at any point in the north country where it was thought advisable to establish a herd.

A copy of a memorandum, prepared by Mr. Hjalmar Lundbohm, delegate of the Royal Swedish Government, for the information of the United States Bureau of Education, is attached as Appendix No. XII to this report, and will be found well worthy of attention, as giving most interesting data regarding Lapps and their reindeer herds in Sweden and Norway.

Appendices No. X and No. XIV deal with reindeer in Siberia, the former being an extract from Chapter No. XVIII of the "Cruise of the Corwin," by John Muir, while the latter embodies excerpts from the submissions of Commodore B. F. Bertholf, formerly Commandant of the United States Coast Guard Service schooner *Bear*, in Bering sea.

A memorandum regarding reindeer in Northern Europe, prepared at the request of the Commission by Captain A. Allanach, is also submitted as Appendix No. XIII.

RECOMMENDATIONS

In conclusion, your commissioners would respectfully recommend:—

- (1) THAT steps be taken, either by the use of aeroplanes or otherwise, to ascertain at the earliest possible date the approximate numbers of MUSK-OX still in existence in Northern Canada, and the localities in which they are to be found.
- (2) THAT the policy of preventing any further slaughter of these animals, either by natives or by white men, except in case of dire necessity, be rigidly enforced.
- (3) THAT a station be established in one of the northern islands, where musk-ox now exist and where young animals may be readily obtained for purposes of domestication, with a view to later bringing considerable numbers to some point further south and more readily accessible, at which their development from a national economic standpoint may be carried on and extended.

Needless to say, the success of this undertaking will, from its inception, depend entirely on the personal and technical qualifications of those who may be entrusted with its management.
- (4) THAT small experimental REINDEER herds be established in a number of such localities as may, after searching Departmental investigation, be found most desirable in points of vegetation and otherwise.
- (5) THAT in the selection of the localities for these stations, the needs of the natives, in the matter of food supply, be given the most careful consideration.
- (6) THAT where suitable arrangements can be made, the various missionary bodies be requested to co-operate in an earnest effort to ensure the success of the undertaking, not only by influencing the natives to protect the animals, but also by encouraging them to learn how to handle and care for them, so that, as in Alaska, they may become herders and eventually owners of herds.

This will involve the gradual working out of a system similar to that so successfully followed by the United States Government in Alaska, whereby small numbers of reindeer are given to the natives in recognition of the interest and industry which they show in the work.
- (7) THAT at least one experienced Lapp deer-man should be detailed to each herd, this being necessary, not only to avoid mistakes in handling the deer, but to ensure that the instruction given to the natives is of a sound and practical character.
- (8) THAT in view of the information furnished by Dr. Grenfell and Mr. W. J. Kjellman, as set forth in Appendix No. XI, and referred to elsewhere in this report, to the effect that a number of Lapp deer-men might be induced to come to Canada and bring their herds with them, steps be taken at once to ascertain the exact conditions in that regard.
- (9) THAT if these conditions are found to be as represented, negotiations be entered into immediately with the view of securing as many of these desirable people as possible, in order that their services may be utilized in the development of the reindeer industry in such areas as may be approved for that purpose.

Your commissioners do not feel that they would be justified in recommending at the present time, any definite policy with regard to the granting of further grazing leases to persons desirous of securing such concessions.

Your commissioners approved the grazing lease granted in 1920 to Mr. Vilhjamar Stefansson on Baffin island, because the local conditions as regards isolation are, in that case, such that it should be reasonably possible to enforce the limitations imposed by the lease with regard to the absorption of wild caribou in the reindeer herd.

Owing to the fact that on the mainland such enforcement would be quite impossible, especially in the case of large, and, therefore, only very partially domesticated reindeer herds, the reindeer would either become altogether wild, or the caribou, if not deliberately exploited for gain, be driven to seek other pastures, thus interfering with their regular, periodical migrations, and in all probability, causing them serious injury.

The granting of leases on Victoria island or Banks island would also involve the large herds of wild caribou which annually cross from the mainland, and many of which remain on these islands from year to year.

The information at the disposal of your commissioners is not sufficient to warrant them in expressing any opinion as to the feasibility of fencing off any of the peninsular areas on the northern portion of the mainland, so as to permit of their being leased for grazing purposes without damage to the wild caribou.

In this connection it should be remembered that in those areas in Alaska to which the reindeer were brought, the wild caribou had been previously almost altogether exterminated.

For the reasons above set forth, your commissioners would advise:—

- (10) THAT great caution be exercised in the granting of grazing leases, and that no such leases be considered until after a most careful Departmental investigation of the local conditions and possibilities.

Altogether apart from the proposed introduction of domestic reindeer the vast herds of wild CARIBOU which undoubtedly still exist in the interior mainland area, repeatedly referred to in this report, constitute a valuable national asset, the importance of which, if properly dealt with, can be enormously enhanced, and your commissioners therefore respectfully recommend:—

- (11) THAT an earnest effort be made to ascertain as soon and as closely as possible the numbers and movements of the Barren Land caribou, especially those on the mainland and on the islands adjacent thereto; as also the numbers and movements of the caribou of other varieties, particularly those in the Yukon Territory and in northern British Columbia.

- (12) THAT a comprehensive survey be made of the vegetation and other conditions having a bearing on the support of herbivorous animals in the interior area, with the object of securing information as to the comparative value of the various districts for grazing purposes; the extent to which these natural pasture lands are now being used by the caribou; the approximate numbers of additional caribou or reindeer which might reasonably be expected to find sustenance in the different districts.

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It will be obvious that in securing accurate and reliable data on these points, the migratory habits of the caribou and the length of time required to reproduce the reindeer moss after it has been eaten down, will have to be closely studied.

- (13) THAT special attention be given to the enforcement of such regulations as will effectively prevent the wasteful or useless slaughter of the wild caribou, either by natives or others.
- (14) THAT an intelligent and systematic campaign be inaugurated, having for its object the extermination of wolves, wolverines and such other animals as prey upon the caribou.
- (15) THAT at each of the Reindeer Experimental Stations, the establishment of which is recommended herein, provision be made for the domestication, on intelligent lines, of such numbers of young wild caribou as may be conveniently handled with the reindeer herd.

All of which is respectfully submitted.

(Sgd.) J. G. RUTHERFORD,
Chairman.

(Sgd.) J. S. McLEAN,
Commissioner.

(Sgd.) J. B. HARKIN,
Commissioner.



Cross between Reindeer and Caribou (very superior animal).

Courtesy of Carl Lomen, Nome, Alaska.

APPENDICES

- No. I. Evidence taken at hearings, Volumes I and II (bound in separate cover).
- II. Reindeer Industry in Alaska. Resume of the operations of the United States Government.
- III. Musk-ox in Domestication: Statement of Professor W. T. Hornaday, Curator, New York Zoological Society.
- IV. Reindeer and Musk-ox, Hudson Bay region: Statement prepared by Captain H. Toke Munn, Arctic Explorer.
- V. Dr. Grenfell's Experiment with Reindeer in Labrador: Statement prepared by Mr. Jose A. Machado, Secretary of Canadian Branch, International Grenfell Association.
- VI. Reindeer herd at Lobster Bay: Statements *re* herd taken over from Dr. Grenfell in 1918.
- VII. Reindeer herd at Fort Smith: Statement *re* herd of reindeer purchased by the Department of the Interior and taken to Fort Smith, on the Slave river, in 1911.
- VIII. Ungava: Submissions of Reverend W. G. Walton, Church of England Missionary, stationed at Fort George, James bay.
- IX. Barren Land Caribou and Musk-ox: Memorandum prepared by Dr. R. M. Anderson, from information secured from Captain J. F. Bernard, commanding schooner *Teddy Bear*.
- X. Reindeer in Siberia: Extract from Chapter XVIII of the "Cruise of the Corwin," by John Muir, Boston, 1917.
- XI. Lapp Immigration to Northern Canada and Lapps as Herders: Memorandum prepared by Mr. Commissioner Harkin, from correspondence passing between Dr. Grenfell, Mr. Jose A. Machado, Mr. Wm. J. Kjellman and the National Parks Branch of the Department of the Interior.
- XII. Lapps and Reindeer in Sweden and Norway: Copy of memorandum prepared by Mr. Hjalmar Lundbohm, Delegate of the Royal Swedish Government, for the information of the Bureau of Education of the United States Government.
- XIII. Reindeer in Northern Europe: Memorandum prepared from letter addressed to Commission by Captain A. Allanach.
- XIV. Reindeer in Siberia. Memorandum prepared from information furnished by Commodore Bertholf, formerly of the United States Coast Guard Service.

APPENDIX No. I

Transcript of Evidence taken at four hearings at Ottawa, bound separately as Volumes 1 and 2, and submitted with this report as Appendix No. I, assembled as follows:—

First hearing, January 24, 1921—Volume 1, pages 1 to 47.

Second hearing, February 4 and 5, 1920—Volume 1, pages 75 to 280.

Third hearing, April 29 and 30, 1920—Volume 2, pages 281 to 433.

Fourth hearing, May 12, 1920—Volume 2, pages 434 to 586.

APPENDIX No. II

REVIEW OF THE ALASKAN REINDEER SERVICE OF THE UNITED STATES DEPARTMENT OF THE INTERIOR AS COMPILED FROM THE OFFICIAL REPORTS OF THE UNITED STATES GOVERNMENT.

In the summer of 1890, Dr. Sheldon Jackson, United States General Agent of Education in Alaska, accompanied the revenue cutter *Bear* in its annual cruise in Bering sea and the Arctic ocean, visiting all the important villages on both the Alaskan and Siberian shores. He found the Alaskan Eskimos in a deplorable condition. They were eking out a precarious existence upon the few whale, seal, and walrus that they could catch, while, across Bering strait, in Siberia, but a few miles from Alaska, with climate and country precisely similar, were tens of thousands of tame reindeer supporting thousands of natives. The flesh and milk of the reindeer furnished food, its skin provided clothing and bedding, and in winter the reindeer made possible rapid communication between



European Reindeer, Teller, Alaska.

the scattered villages. Dr. Jackson was impressed with the fact that it would be wise national policy to introduce domestic reindeer from Siberia into Alaska as a source of supply for food and clothing to the Alaskan Eskimos, and on his return to Washington, in September, 1890, brought the matter to the attention of the Commissioner of Education, Dr. W. T. Harris, who endorsed the project and gave it his enthusiastic support. Pending the approval of a congressional appropriation for the support of the enterprise, an appeal was made to benevolent individuals for a preliminary sum in order that the experiment might be commenced at once. The sum of \$2,146 was secured, and sixteen reindeer were purchased in 1891, and 171 in 1892. These deer were obtained from Cape Serdqe and South Head, Siberia, and were brought over on the revenue cutter *Bear* to Port Clarence. Siberian herders were brought over

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with the reindeer. Arrangements were made that these herders were to be fed, clothed and housed, also furnished with tobacco or its equivalent, at Government expense, and in addition to the above \$50 worth of barter goods at the end of the year.

In 1892, the Teller Reindeer Station was established at the extreme north-east corner of Port Clarence bay, near Grantley harbour. This, as the work grew, became the base of supply from which new centres of the reindeer industry were established.

In 1893, Congress made the first appropriation of \$6,000 for the work. Dr. Jackson, in order to secure some intelligent Norwegian or Swede accustomed to the methods of caring for reindeer in Lapland, sent a notice to the Scandinavian newspapers in the United States that the Government wished to secure the services of a man acquainted with the management of reindeer. About 250 replies were received, and Mr. William A. Kjellman, of Madison, Wis., was selected as superintendent of the reindeer station, as he had had considerable experience in buying and selling reindeer and reindeer products in Lapland. It was almost the universal opinion of those from whom replies were received that



A winter corral on the Buckland River, Alaska—constructed of spruce poles and brush—covers several acres—will accommodate from eight to ten thousand reindeer.

Courtesy of Carl Lomen, Nome, Alaska.

there were no full-blooded Lapps in the United States, and that it was essential to the success of the movement that a few families of Lapps should be secured to do the herding, and also to give instruction to the Eskimo young men. They also expressed the opinion that the trained dogs of Lapland were necessary for herding. They further took the position that the Lapps have methods for the care of reindeer superior to the customs of the Siberians. Upon the selection of Mr. Kjellman as superintendent of the station, he was at once sent to Lapland for the necessary Lapps and dogs. The reindeer fund of Congress for 1894 being exhausted, it became necessary to again appeal to private individuals for \$1,000 to defray the expenses of sending Mr. Kjellman to Lapland, and to pay the transportation of the Lapps and their families to the United States.

During the summer of 1893, 127 additional reindeer were purchased in Siberia.

In the summer of 1894, as the first herds were purchased from private funds, it was proposed to give 100 reindeer to each of the following stations: the Congregationalists, at Cape Prince of Wales; the Swedish Evangelical

Church, at Golovin Bay; the Roman Catholic Church, on the Yukon river, and the Presbyterian Church, at St. Lawrence island. It was also proposed to offer a similar number of reindeer to other denominations at work in that region.

In 1894, seven herders were brought from Lapland and were distributed to the various reindeer stations.

In 1895, and again in the fall of 1896, disease broke out in the herd similar to foot rot in sheep, which was attributed to the damp ground, and when the herd was changed to drier ground the sickness gradually abated.

In 1896, the United States Government established a reindeer purchase station in Siberia. In previous years the work of purchasing had been confined to five or six weeks in the summer, and it was found that by the establishment of this station they could purchase during the whole year and have the reindeer on the coast ready for transportation during the season when the Bering sea and adjacent coast was free from ice. The agent at this station was furnished with the necessary supplies and a large stock of barter goods to trade for reindeer.



Modern Alaskan Reindeer Corrals for Marking Reindeer—1,680 fawns marked in 10½ hours.
Old Method—600 fawns were marked in 18 days.

The increasing number of reindeer passing into the hands of apprentices and missionaries made it important that rules should be formulated for regulating and registering the brands so that each deer owner would be in a position to know his animals. Branding was done by cuts on both the right and left ear, and it was made a punishable offence to have reindeer unbranded or skins thereof without ears.

The Superintendent of Teller Reindeer Station, in his report of 1897, stated that the Laplander makes the best herder, as he looks with pride upon his skill in herding, training, and general managing of reindeer in the same manner that an artist looks upon his work. By proper treatment the Laplander will adopt and put in practice any suggestion toward improvement, but what is needed is his skill in driving and handling, milking and the general use of the reindeer,

and acknowledges the fact that the Laplander is far ahead in that matter and practically the only people who could be used to satisfactorily train the native Eskimo.

In 1897, reindeer were purchased from Siberia at an average cost of \$2.50 to \$4 in barter goods.

A further purchase of reindeer was made in 1898 in Siberia, amounting to 161.

Dr. Jackson reports that there were on December 31, 1903, 6,505 reindeer gathered in eleven herds at nine central stations, and that during the spring of 1903, 1,877 fawns were born and lived. The total appropriations up to this time covering a period of twelve years made by the United States Government



Reindeer on the Trail, Alaska.

Courtesy of Carl Lomen, Nome, Alaska.

for the introduction of reindeer amounted to \$183,000, for which the Government had to show 6,505 reindeer used for the instruction and support of about 300 natives.

The North Eastern Siberian Company, Limited, had agreed to deliver 800 female reindeer to the Government at Teller Reindeer Station. The company is said to have secured in Siberia 700 deer in fulfilment of its agreement with the Government, but before navigation opened in northern Bering sea the Russian Government recalled its permission to export the deer to Alaska. On account of this action of the Russian Government, no deer were exported from Siberia to Alaska during the year 1903.

In the same year it was pointed out that owing to interbreeding within the herds they were deteriorating, and it was then suggested that there should be an interchange of bucks between the various reindeer stations.

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The report of 1904 gives the following statistical table showing the increase from the time of the introduction of domestic reindeer into Alaska up to 1904:—

Year	Imported from Siberia	Total in herd
1892.....	171	143
1893.....	124	323
1894.....	120	492
1895.....	123	743
1896.....		1,000
1897.....		1,132
1898.....	161	1,733
1899.....	322	2,394
1900.....	29	2,692
1901.....	200	3,464
1902.....	30	4,795
1903.....		6,282
1904.....		8,189
Total.....	1,280	

The following table shows the increase of fawns from 1893 to 1904:—

Year	Balance from previous year	Fawns surviving	Per cent of increase of herds by fawns
1893.....	143	79	55
1894.....	323	145	44
1895.....	492	476	56
1896.....	743	357	49
1897.....	1,000	466	46
1898.....	1,132	626	55
1899.....	1,733	638	37
1900.....	2,394	756	32
1901.....	2,692	1,110	41
1902.....	3,464	1,654	48
1903.....	4,795	1,877	40
1904.....	6,282	2,284	36

Total fawns surviving, 10,267.

Average increase of herds by fawns, 1893-1904, 45 per cent.

In 1907, rules and regulations were codified for the reindeer service in Alaska. They provided for the supervision of herds and stations to be included in the duties of the District Superintendent of Schools under the United States Bureau of Education. An apprentice on entering the reindeer service, if his work is approved by the local superintendent, receives at the end of the first year of his apprenticeship six reindeer (four females and two males); at the end of his second year, eight reindeer (five females and three males); at the end of his third year, ten reindeer (six females and four males); at the end of four

years, if the apprentice has been satisfactory and successful in the care of reindeer and is twenty-one years of age, he is on the recommendation of the local superintendent, certified as a trained herder. Provision is also made for the extension of the apprenticeship if he has failed to qualify in four years, but he is granted no extra deer during the period of the extension. Upon the termination of his apprenticeship, the apprentice becomes a herder and assumes charge of his herd, subject to the supervision of the school authorities; the herder whose herd numbers at least 50 reindeer shall train apprentices and distribute to them reindeer until he shall have trained and rewarded three apprentices; his first during the period when his herd numbers at least 50 and not more than 150; the second when his herd numbers at least 151 and not more than 250; and the third apprentice when his herd numbers at least 251 and not more than 300 reindeer.

No native herder is permitted to sell, exchange, give, kill (except in cases of mercy) or in any way dispose of any female reindeer except to the Government of the United States or, with the written approval of the District Superintendent of Schools, to another native inhabitant of Alaska.

The term "native of Alaska" as used in the rules and regulations signifies a descendant of any of the aboriginal inhabitants of Alaska.

Realizing that the establishment of an export trade in reindeer products was essential to the success of the enterprise, the bureau encouraged the shipment of reindeer meat and hides from Alaska to the States. The last steamer to leave Nome before the closing of navigation by ice brought to Seattle in October, 1914, twenty-five carcasses of reindeer, which were placed on sale at Seattle, retailing at from 20 to 35 cents per pound. The Chief of the Alaska Division also brought from Nome three carcasses to be distributed among the five continental railway lines running out of Seattle, in order that reindeer meat might be given a trial on dining cars, with a view to securing for the natives contracts for the delivery of reindeer meat each season.

During the winter of 1914-15, the Bureau's Superintendent, who is stationed at Nome, with the approval of the Commissioner of Education, distributed among the Eskimo herders in northwestern Alaska a proposal from a cold-storage company operating between Seattle and Nome, to market in Seattle for Eskimos on a commission basis, the reindeer meat consigned to said company. This action will probably result in the shipment of a considerable quantity of reindeer meat from Nome during each summer. The responsibility of accepting or rejecting the proposal of the cold-storage company rested with the native owners of reindeer, the superintendents acting in an advisory capacity and assisting in making the necessary arrangements.

Soon after the inception of the reindeer enterprise, certain Lapps were brought from Lapland to Alaska and employed by the Bureau as instructors of the Eskimos in the care and management of the reindeer, each Lapp receiving a certain number of reindeer in payment for his services. During the summer of 1914, a company, organized at Nome, purchased about 1,200 reindeer from one of these Lapps. This company intended to purchase other herds owned by Lapps, and to engage in the exportation of reindeer meat and hides.

In 1914, the reindeer industry extended from the mainland to the outlying islands. During August, 1914, upon the request of the Department of the Interior, the revenue cutter *Manning* conveyed a herd of forty reindeer from Ugashik, on the Alaska peninsula, to Atka, a remote island in the Aleutian chain, where it was a valuable factor in alleviating the deplorable conditions

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which have hitherto prevailed upon that desolate island. The extension of the reindeer industry into southeast Alaska was begun during October, 1914, by the shipment to Metlakatla, on Annette island, of eight reindeer from the herd in the vicinity of Nome.

NUMBER OF REINDEER BELONGING TO EACH CLASS OF OWNERS IN 1914-15

Owners	No. of Reindeer		Increase		Per cent owned	
	1914	1915	No.	Per cent	1914	1915
Government.....	4,113	3,408	705	17	7	5
Missions.....	5,924	6,890	966	16	10	10
Lapps and other whites.	10,007	13,262	3,255	33	17	19
Natives.....	37,828	46,683	8,855	23	66	66
Total.....	57,872	70,243	12,371	21		

ANNUAL INCREASE AND DECREASE OF REINDEER

Years	Balance from previous year	Fawns surviving	Imported from Siberia	Killed for food and skins	Total in herd June 30
1892.....			171	28	143
1893.....	143	79	124	23	323
1894.....	323	145	120	96	492
1895.....	492	276	123	148	743
1896.....	743	357		100	1,000
1897.....	1,000	466		334	1,132
1898.....	1,132	625	161	185	1,733
1899.....	1,733	638	322	299	2,394
1900.....	2,394	756	29	487	2,692
1901.....	2,692	1,110	200	538	3,464
1902.....	3,464	1,654	30	353	4,795
1903.....	4,795	1,877		390	6,282
1904.....	6,282	2,284		377	8,189
1905.....	8,189	2,978		926	10,241
1906.....	10,241	3,717		1,130	12,828
1907.....	12,828	4,519		1,508	15,839
1908.....	15,839	5,416		1,933	19,322
1909.....	19,322	6,437		2,844	22,915
1910.....	22,915	7,239		2,829	27,325
1911.....	27,325	9,496		3,192	33,629
1912.....	33,629	11,254		6,407	38,476
1913.....	38,476	13,681		4,891	47,266
1914.....	47,266	16,866		6,260	57,872
1915.....	57,872	21,022		8,651	70,243
Total.....		112,892	1,280	43,929	

Two hundred and forty-six killed in Barrow relief expedition.

Some of the figures which make up these totals are estimated.

Per cent of annual increase by fawns, 40; net since importation, 23.

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AMOUNTS APPROPRIATED, GROWTH, AND RESULTS OF INTRODUCTION OF REINDEER INTO ALASKA.

	First ten years (1893-1902)	Next five years (1903-07)	Last eight years (1908-15)	Total
Appropriations.....	\$133,000	\$99,000	\$75,000	\$307,000
Number of herds established.....	9	7	60	76
Number of natives becoming owners of reindeer.....	68	56	1,016	1,140
Average cost to Government per owner	\$1,956	\$1,768	73	269
Number of reindeer passing into native ownership.....	2,841	3,565	40,277	46,683
Valuation of same.....	\$71,025	\$89,125	\$1,006,925	\$1,167,075
Income received by natives.....	\$4,500	\$15,500	\$350,407	\$379,407
Number of Government reindeer at end of period.....	2,247	4,684	3,408	3,408
Valuation of same.....	\$56,175	\$117,100	\$85,200	\$85,200

WEALTH PRODUCED BY INTRODUCTION OF REINDEER IN ALASKA

Valuation of 46,683 reindeer owned by natives in 1915 at \$25 each.....	\$1,167,075
Total income of natives from reindeer, 1893-1915.....	370,407
Valuation of 23,560 reindeer owned by missions, Laplanders and other whites, and Government, 1915.....	589,000
Total income of missions and Laplanders, and other whites, from reindeer 1893- 1915.....	107,361
Total valuation and income.....	\$2,242,843
Total Government appropriations, 1893-1915.....	307,000
Gain (621 per cent).....	\$1,935,843

In 1916, the appropriation of \$5,000 for the distribution of reindeer among the natives and the training of the natives in the care and management of reindeer was used to establish herds and to support native apprentices being trained in the industry. The increased cost of food and clothing had made it impossible for the Government to train as many apprentices with the same appropriation as formerly.

The fairs during the winter proved to be a great stimulus to the natives engaged in the reindeer industry.

A conservative estimate would place the total number of reindeer in Alaska on June 30, 1917, at 95,000. This large number is the result of the introduction into Alaska of 1,280 reindeer from Siberia. The statistics for the year ending June 30, 1916, show a total of 82,151 reindeer, distributed among 85 herds. Of this number 56,045, or 58 per cent, were owned by 1,293 natives; 3,390, or 4 per cent, by the United States; 5,186, or 6 per cent, by missions; and 17,530, or 33 per cent, by Laplanders and other whites. That this industry is of paramount importance to the natives interested is recognized in the fact that in 1917 the income of the natives from this industry, exclusive of meat and hides used by themselves amounted to \$91,430.

While the primary object of the industry was to assist the natives and for this reason it had been restricted to them as much as possible, the years 1914-17 saw the entrance of the white man into the enterprise. The rules and regulations forbade natives to sell female deer except to natives. However, certain Laplanders who were brought to Alaska for the purpose of instructing natives in

the care of deer, for which they received reindeer, were not subject to this restriction and consequently a herd of about 1,200 deer was acquired by Lomen and Company, of Nome, during 1914. During 1915, this company desiring to increase its herd and not finding any more Lapp deer conveniently available, negotiated a purchase of about 1,000 deer from herds of the Swedish Evangelical Mission Covenant of America, at Golovin. These herds were the result of a loan of deer made to the mission during the earlier days of the industry, when it was the desire of the Bureau of Education to distribute the deer as quickly as possible. The appropriations being small and the philanthropic enterprise being in line with missionary work, it was thought that the loan of a small herd to each mission in the field, with the understanding that the same method of distribution to the natives should be used as in the Government herds, would be of mutual assistance, and would aid materially in the rapid distribution of the deer. Some of the earlier contracts covering such loans were drawn very loosely. It appears that Golovin Mission's loan was made under oral agreement with the then local missionaries. Years later, the missionaries had changed and the agreement was gradually forgotten, so that when the offer of about \$18,000 was made by Lomen and Company, it was forthwith accepted. The matter has since been the subject of controversy between the Bureau and the mission board, in which the former has tried to show the board that, although the legal reasons may be poor, the board is morally bound to preserve the original objects of the introduction of deer into Alaska, namely, the distribution among the natives. The Norwegian Evangelical Lutheran Church, at Teller, in 1916 sold about 300 deer to Lomen and Company. The loan to this mission is covered by written contract, which, it is alleged, has been deliberately broken by the mission by this sale of female deer to other than natives. The matter was referred to the Department of Justice, and its final outcome will be important, since it will affect the status of all deer now held by missionary organizations in Alaska.

In 1916, an increased appropriation was recommended for the purpose of employing two specialists, whose duties would be to introduce methods for improvement of breeding and scientific handling of the deer; to investigate reindeer diseases and establish means of combatting them, and to give special attention to all matters pertaining to the improvement of the industry. The enterprise had then assumed such proportions as made it imperative that it be handled in a scientific manner. The past appropriations had been only large enough for the work of distributing the deer among the natives. Because of the lack of funds this distribution had necessarily been limited and very gradual.

The following table shows what a financial success this phase of Government enterprise has been during the 25 years since its inception:—

Valuation of 67,445 reindeer owned by natives in 1917, at \$25 each.....	\$1,686,200
Total income of natives from reindeer, 1893-1917 (25 years).....	568,352
Valuation of 31,134 reindeer owned by missions, Laplanders and other whites, and Government, 1917.....	778,350
Total income of missions and Laplanders, and other whites, from reindeer, 1893-1917.....	214,443
Total valuation and income.....	\$3,247,345
Total Government appropriation, 1893-1917.....	317,000
Gain (926 per cent for 25 years, or an average annual gain of 37 per cent) ..	\$2,930,345

NOTE.—The 16 reindeer stated in earlier United States Government Reports to have been imported to Alaska in 1901, were apparently paid for by private subscription, as they have been omitted from the schedules and calculations of the Bureau of Education. These later reports show the 171 head purchased in 1892, as the commencement of Government importation, the original 16 not forming part of the total importation of 1,280 head.

The reindeer industry in Alaska, which as shown by the foregoing statement, was inaugurated by the Bureau of Education of the United States Department of the Interior, has now attained such proportions that the Department of Agriculture has been asked to assist in its development.

During the past year the officers of the Bureau of Biological Survey have accordingly been investigating the industry, with a view to improving the methods of breeding and handling, so as to increase the size and weight of the animals, and at the same time to take such steps as will prevent the parasitic infestation and other conditions which have had so detrimental an effect upon the herds.

In July, 1919, Dr. E. W. Nelson, Chief of the Bureau of Biological Survey, visited Alaska, taking with him Dr. Hadwen, formerly Chief Parasitologist of the Canadian Government, as also a range expert from the United States Forest Service.

A reindeer experimental station has been located at Unalakleet, on the coast of Bering sea, about one hundred and twenty-five miles from the mouth of the Mackenzie river and eighty miles east of Nome, there being many reindeer herds in that region.

The investigations which have been since conducted have shown that certain simple changes in the methods of handling the reindeer herds will be of great benefit in reducing losses and producing better stock.

Much of the land has been over-grazed, resulting not only in depreciation of the vegetation on the range, but in serious infestation of the reindeer with parasites of five or six different kinds. An endeavour is being made to determine a grazing unit, that is to learn how much land, under the conditions of the range, one reindeer needs to maintain it for a year.

When this information is secured it will be possible to work out a system of allotments of territory to the owners of different herds.

The natives now own 150,000 reindeer, which will increase rapidly, and their interests must be safeguarded.

The following quotations from the evidence given by Dr. Nelson, before the Committee on Appropriations, at Washington, are very interesting:—

“A rapid survey of the country to determine the area suitable for reindeer and its camping capacity will be of prime importance in developing the industry. At the same time the proper methods of handling the herds must be worked out. Interest in this industry will develop, and it will be of the greatest value to the future of Alaska.

“As a matter of fact, it appears to be the one great outstanding opportunity for new development in the near future in northern Alaska. The present 200,000 reindeer in Alaska, in addition to tens of thousands killed for meat, all came during the last twenty-eight years from an original importation of 1,280 animals. The increase is almost unbelievable. People have asked me what the future of the industry is likely to be, and I have replied by asking them the question, ‘If 1,280 reindeer in twenty-eight years produced the present 200,000 animals, what is likely to be the increase from 200,000 animals in the next twenty-eight years?’ In other words, the industry, properly handled, should have a great future.”

In this connection it is worthy of note that Doctor Nelson does not do the original reindeer full justice, inasmuch as only one hundred and seventy-one were actually imported twenty-eight years ago, the remainder having come in in small detachments during the ten years following, it being 1902 before the total figure of 1,280 was reached.

It will be seen that the United States proposes to utilize the woodland caribou in the improvement and development of the existing reindeer herds, Dr. Nelson's evidence on this point before the Committee on Appropriations at Washington, being as follows:—

“We have an expert up there now investigating the wild caribou herds of Alaska. There are big herds of caribou in the interior on the headwaters of the Kuskokwin river, about the Mount McKinley region, and elsewhere are large woodland caribou, some of the bulls of which are reported to dress up to about 400 pounds each. We plan to locate and capture some bulls of this stock and use them with one or two experimental herds of reindeer cows for the purpose of building up a higher grade of reindeer, having greater weight and increased hardiness. I believe it will be practicable in less than ten years to have the reindeer of Alaska running from 250 to 300 pounds to the carcass, instead of 150 pounds as at present. Suppose you add 100 pounds to the weight of each reindeer steer for slaughter, you would have increased the value of the fully developed Alaska reindeer industry enough to bring the potential output around \$60,000,000 at present values. That is more than the fisheries of Alaska produce.”

APPENDIX No. III

MUSK-OX

Letter addressed to the Commission by Professor W. T. Hornaday, Curator, New York Zoological Society.

NEW YORK ZOOLOGICAL SOCIETY,
185TH ST. E. SOUTHERN BOULEVARD.
May 28, 1919.

DEAR SIRs,—My personal experience with the musk-ox species has been confined to efforts to maintain that species here in the Zoological Park. It is quite true that we have been very successful in keeping musk-ox specimens alive, and rearing them to maturity in the, to them, unfortunate climate of New York City, and it is also true that we have secured the best record thus far in the longevity of captive musk-ox. The specimen which lived longest we had with us for very nearly eight years.



Musk-ox Calf—Courtesy of Dr. W. T. Hornaday, Zoological Society, N.Y.

In addition to this I have read, and at times studied, every scrap of musk-ox literature that I could obtain. Needless to say, I have always been keenly interested in that remarkable animal.

I have talked with Mr. Stefansson and have had several very interesting conversations with him regarding his plan for musk-ox domestication. While I feel that the undertaking is beset with many difficulties, I shall be the last person in the world to discourage experiments. I realize quite fully the value that would accrue to civilization in Northern Canada if the domestication of the musk-ox could be accomplished on an extensive scale. I think that the stake is worth playing for, patiently, skillfully and determinedly. The chances against a quick and easy winning are, in my opinion, about as nine to one; but in view of what man has accomplished in other directions, it does seem worth while to pursue the musk-ox idea.

In my opinion, the very first thing for you to call for is a thoroughly definite and fully detailed plan, that can be considered and judged on its merits, and either adopted, modified or discarded. At present I know of nothing more available for discussion than the mere outline of the idea. I have no doubt Mr. Stefansson would, if asked, be glad to enter into details covering the selection of a locality as being most suitable and advantageous for the experiment, the capture and transportation of specimens, and finally, their care in captivity.

It must be remembered that in the domestication of a wild species, fenced areas are absolutely essential. I think there is no such thing possible as acclimatizing the musk-ox in a state of semi-domestication, for such subsequent use as man may elect, without resorting to wire fences, and plenty of them. In my opinion, large areas will need to be enclosed in order that the animals may be as free as possible and yet not be permitted to wander away.

I think that any specimens of the musk-ox that might be brought into any civilized settlement would in the first instance have to be most carefully guarded against being killed by dogs; and in the second place, they must be imprisoned by fences or they assuredly would wander away and come to grief.

The capture of specimens would be a comparatively easy matter. An expedition could be sent to Ellesmere Land in the spring season, and if conditions are at all as they were in the days when Mr. Paul J. Rainey captured a herd for us, it would be a matter of no great difficulty to obtain twenty-five young specimens. These specimens could then easily be transported to Fort Churchill, or some other point on the west shore of Hudson bay, which I should judge would be the best locality available for the experiment.

I will not enter upon the subject of the care of the musk-ox in captivity when first captured, for by reason of our experience that now has become a routine matter.

The crucial test would come when the animals would be sent forth into the world to subsist through their own efforts, not only in summer but in winter. Whether they would find food of a satisfactory character in their new home can be determined only by actual experiment.

Needless to say, all these various steps must be made the subject of careful study, and executed on a scientific basis. Fortunately, the cost involved would not be so great as to be prohibitive.

Thus far, the musk-ox never has bred in captivity, and the calves that were captured at Franz Fjord, on the east coast of Greenland, and transported to Norway for acclimatization in a similar locality promptly failed to survive.

In the United States (save now and then an exceptionally choice individual) the moose cannot live or breed south of the southern boundary of the habitat that it occupied when man became acquainted with it. Just why the moose can

live in the Adirondacks and cannot live in the Catskills of southern New York, many have wondered, but nobody knows. There have been only very few cases of the moose breeding outside of its own natural haunts, and I regard those as truly exceptional occurrences..

I sincerely hope that the musk-ox experiment will be made, and if it is, the Canadian Government may rest assured that all zoologists will be keenly interested, and will wish it a full measure of success.

I do not believe that musk-ox wool ever can become a valuable commercial product. I think there is no practical way in which the wool can be made available in commercial quantities. We once combed the wool completely out of a two-year-old musk-ox at a time when it had been shed and was ready to work out through the long hair. It is a long and tedious operation, and about one month later that particular musk-ox died of pneumonia. We never again attempted an experiment of that kind.

In my opinion, the musk-ox would be valuable only as a domesticated food animal, but that factor alone would amply justify the domestication of the species.

There are many things which might be said about musk-ox temper and temperament, but it is unnecessary to enter upon that here.

Concerning caribou, I believe that it would be inadvisable to attempt to domesticate the Barren Ground species. It is the view of the biologist and stockbreeder that it takes many generations really to domesticate a wild species, so that it ceases to be wild, and takes kindly to captivity, generation after generation. Many generations of reindeer-breeding have produced that temperament in the reindeer, and that is an asset which it is well worth while to emphasize. It is my recommendation that instead of attempting to domesticate the Barren Ground caribou, it would be wiser to introduce reindeer. There is every reason to suppose that reindeer can live and thrive wherever caribou can live, and now, in view of the reindeer breeding in Alaska, it will be a comparatively easy matter to secure not only breeding stock, but also natives who know how to handle it, and to instruct other parties in its care.

(Sgd.) W. T. HORNADAY.

APPENDIX No. IV

REINDEER AND MUSK-OX, HUDSON BAY REGION

Letter addressed to the Commission by Captain H. Toke Munn, Arctic Explorer.

JUNIOR CARLTON CLUB,
PALL MALL, S.W. 1,
March 15, 1920.

DEAR SIR,—Replying to yours of February 24th (J.C.C./U.W.) I enclose herewith some notes on the subject for the Commission. Mr. V. Stefansson wrote me a series of questions about two or three months ago to which I replied very fully. I understood this was for your Royal Commission of which he was a member. I have not the copy of my reply by me. Had I been financially able to do so it would have given me much pleasure to come to Canada to give evidence on this subject, for no doubt the Commission would like information on many points I have not touched, and also have some queries as to those I have dealt with.

One somewhat serious objection to using Coats—or another island—as a breeding ground is the difficulty of transporting the domesticated caribou or reindeer elsewhere unless a good harbour was available. This would not apply to any herds raised for food. I believe in some years the narrowest waters between Coats and Southampton islands must freeze and set, and by careful observation a herd could be driven across. For experimental purposes an island is vastly preferable, as all losses from wolves, straying into wild herds, native hunters unaware of the domestication experiments, etc., would be avoided. The Commission may consider my report unnecessarily unfavourable to experiments on Baffin's Land. Personally, I should welcome such experiments there, though I should consider them doomed to failure except for the slight benefit the natives would eventually obtain from skins and meat accruing to them. The subject is too long a one to deal with in a letter such as this, and I only need add that the cost of maintaining a herd and protecting it on Baffin's Land would be altogether out of proportion to any benefits likely to be obtained. I shall be happy to reply further to any queries you may send. I might state I expect to sail for the Arctic in June with our little vessel (150 tons), and will be glad to bring the Commission back any particular information they may require if I can obtain it.

I am, sir, yours faithfully,

(Sgd.) HENRY TOKE MUNN.

NOTE.—Captain Munn's report follows.

REPORT OF THE ROYAL COMMISSION

Reindeer

The establishment of a herd of reindeer in the Arctic is quite feasible and the best place for the introduction of a nucleus herd would be on one of the islands in Hudson bay, preferably Coats island.

Location of
Nucleus Herd

This island is about sixty miles long, the feed is excellent, there are no wolves there, and on the north side plenty of walrus can be obtained for blubber and food if Esquimaux are employed as herders. There is already a considerable number of Barren Land caribou there. These should be reduced to a small number and the calves caught and put in with the reindeer.

Caribou

I am slightly familiar with the Lapland reindeer: they are for all practical purposes identical, as far as I know, with the Arctic caribou. I have known at least one successful instance of domestication. The only animals which might prey on tame reindeer on Coats island are the Polar bears, which are numerous on Coats island though they very rarely are able to kill caribou. Polar bear are easy to kill and would soon abandon a place where they were frequently hunted; a few Esquimaux dogs would be necessary for this work and would have to be trained not to hunt reindeer; this presents some difficulty, but it is feasible.

Domestication of
Barren Land
Caribou

Southampton
Island

Southampton island would be another possible reindeer ground, but the caribou are fairly numerous there and would cause some losses by reindeer joining them; also there are wolves there.

Ice Setting
to Mainland

Rowes Welcome—on native reports—freezes and the ice sets to the mainland about every other year. In 1916, 1917, 1918 the ice did not set there to my own knowledge. There are other islands in Hudson bay, *e.g.*, Salisbury, Nottingham, Mansell, Charles, might be suitable for reindeer, the first two are hilly and broken, also natives frequently winter there.

Other Islands in
Hudson Bay

The Hudson's Bay Company have, I am told, recently put an out station on Coats island; before this no natives went there to stay.

The expenses of experimentation with reindeer on Coats island could be largely defrayed by importing Northern Pacific blue fox there and allowing them to increase; there are many Arctic fox there and they seem to do well. If this were done it would have to be made a Government reserve. I know of no place where experiments in domestication of Barren Land caribou could be better carried on.

Southern
Baffins Land

The establishment of reindeer herds on Baffin's Land presents several difficulties. Caribou are very numerous round Lake Nettling and in the interior of Baffins' Land in summer. Of late years large herds have come down to the northwest shores of Cumberland gulf in winter, always followed by wolves, for these pests live on the caribou; wolves were numerous at the above named locality last winter. The risk of loss, both from reindeer mingling with caribou and becoming wild, and from wolves would be great.

Wolves

REINDEER AND MUSK-OX

The reindeer would also have to be protected from the Esquimaux dogs; these are an important necessity to the natives and cannot be done without. Reindeer could not fill many of the functions carried out by the sled dogs, *e.g.*, the smelling out of the seal breathing holes in winter, travelling over bad or light ice, bear hunting and protecting the native igloos from attack by bear. Dogs are, and always will be, a prime necessity to natives of Baffins Land.

Native Dogs

Dogs versus Reindeer for Natives

Reindeer could not make many of the long journeys done by dogs because they are done on the sea ice, and no reindeer food is obtainable in places along the coast for many miles. Dogs are fed on seal on these journeys as a rule.

Caribou skins are a prime necessity to the natives for winter clothing; they are killed for this purpose in September.

Northern Baffins Land

The establishment of a herd of reindeer on Northern Baffins Land would be difficult and serve no useful purpose. Caribou are numerous, and, consequently wolves, and I know of no small islands there accessible to a ship in any year (as Coats and other Hudson bay islands are) and surrounded by moving pack ice in winter, thereby ensuring the safety of the herd from wolves, or loss by wandering. Even Lancaster sound generally freezes over and makes it possible for natives to cross to North Devon for Musk-ox or polar bear. On Northern Baffins Land, practically all winter travel in on the sea ice. This frequently sets at certain places in a broken up and very rough condition quite impossible for caribou to travel over as draught animals. I believe the number of caribou on Baffins—north and south—to be very large; the natives are few and only hunt them in certain localities. Between Home bay and Ponds inlet there are now no native settlements, whalers having ceased to come to these waters; in consequence, the natives have been compelled to join other settlements (at Ponds inlet on the north and Cumberland gulf on the south) in order to procure their necessities as ammunition, firearms, etc. With these natives the days of the bow and arrow are gone; they would starve were they unable to obtain ammunition now. At Ponds inlet, owing to a fairly steady supply of necessities, the birth rate has exceeded the death rate considerably in the past ten years; if they cannot get necessities they will not have children. I have no doubt whatever of the practicability of domesticating the caribou of the Arctic, though I cannot see where any useful purpose would be served by attempting it on Baffins Land generally.

Lancaster Sound

Ice conditions

Number of Caribou

Native Settlements

Native Birth and Death Rate

Domestication of Caribou

I am of the opinion reindeer or domesticated caribou could be very usefully employed on the south and west shores of Hudson bay and up the rivers into the interior; a rapid journey could be made by caribou from York Factory to Winnipeg in winter, or from Moose Factory to Cochrane. Larger loads and quicker journeys could be accomplished with caribou than with dogs, especially where the snowfall was considerable and the routes—as on rivers—wide and unencumbered with timber, etc. Domestic caribou on Baffins Land would be difficult to hold if

Where Domestic Caribou Would be Useful

Baffins Land

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wild herds come down, difficult and costly to preserve from wolves and natives' dogs, and impracticable to use on most of the usual winter travel routes.

Navigation Dates

The average date Cumberland gulf is navigable by steamers is August 1, and they must leave by October 1, or risk being caught by the pack ice closing the mouth of the gulf. Ponds inlet is even a shorter season; no vessel can get to the eastern coast of Baffins Land without either going northabout—across Melville bay—or south of the middle pack and between it and the land. This last route is seldom navigable till after the first week in August.

East Coast of
Baffins Land

Food Values
of Caribou

From a food point of view, caribou killed before August are not in good condition. September, October, and with good conditions, November, are the fattest caribou months. Caribou quickly lose condition; during the migratory period they are generally poor.

Hudsons Bay
Islands and
Fat Caribou

The fattest caribou I know of in the Arctic are those of Coats island. They are unable to migrate, the food is good, the mosquitoes are not troublesome and there are no wolves to harry them; if conditions are the same, Mansell island and Charles island would be equally good. For food purposes as a commercial proposition, I believe these or similar islands to be the only feasible places. I am not well acquainted with the mainland between Churchill and York Factory.

The idea propounded recently of driving the herds of caribou to a rail head with aeroplanes is childish; they would be unfit for food after a week's harrying. Incidentally, the natives dependent on them elsewhere would starve; caribou lose fat and flesh very rapidly under unfavourable conditions.

Musk-ox

There are no musk-ox on Baffins Land; west of Prince Regent inlet, to the north, and west from Wager inlet and Repulse bay to the south, they are found.

They were numerous on North Devon, but the natives have reduced them considerably. Very large numbers occur on Ellesmere Land, particularly to the west side; they are plentiful on Melville island and Byam Martin island.

I have no doubt they would domesticate readily, and I consider Coats island a very suitable place to experiment. Musk-ox and caribou do not interfere with each other and use the same food.

As soon as feasible, the experiment should be made of cutting (gelding) the young bull calves; I have no doubt they would be far more valuable for food purposes. Musk-ox meat is excellent, except the older bulls which are "strong," and at the rutting season, musky. Musk-ox hides have not a great value. The average pre-war prices were about 50s.; at the January sales this year some sold for £4 10s. The demand is small for them.

Musk-ox are more local—less migratory—than caribou; if food is plentiful they will stay a long while in one locality; they prefer hilly ground, though they are frequently in considerable

REINDEER AND MUSK-OX

numbers on the barren lands where this condition does not obtain. Musk-ox wool has a market value; it is a "slippery" wool rather like Shetland. The wool is shed every year. I do not consider much need be done to protect musk-ox at present. The larger herds are too inaccessible to make their killing profitable, and the skins are not worth enough. To-day a white fox pelt is worth more than a musk-ox skin, and infinitely easier to kill, carry and trade.

An experiment in the food value of the musk-ox would be most interesting, and likely to give some very surprising results if carried out on cattle ranging methods.

Food Value
of Musk-ox

In conclusion I would point out that it is important that in any considerable action by the Government, the native population be considered.

A systematic slaughtering for food purposes of, say, the caribou of Southern Baffins Land, would certainly not be profitable and might bring hardships and probably starvation on the Esquimaux there. I say "certainly not profitable," because I take into consideration the condition that meat would be in, the distance from market, and the kind of steamship required for navigating these waters. The natives are the wards of our Canadian Government and are entitled to consideration as such.

Conclusion

That there is a future for domestic caribou, both for travelling purposes, food and Arctic clothing, seems certain, and it is highly probable musk-ox can be domesticated profitably also.

(Sgd.) H. TOKE MUNN.

APPENDIX No. V

DR. GRENFELL'S REINDEER EXPERIMENT IN LABRADOR.

Statement prepared by Mr. Jose A. Machado, Secretary, Canadian Branch of the International Grenfell Association.

In January, 1908, Dr. Grenfell landed 250 domesticated reindeer from Lapland, which were located in a comparatively small area, in northern Newfoundland, near St. Anthony, where the deer fed entirely upon the moss which grows in great abundance in all that part of the country.

In four years the herd increased from 250 to over 1,200.



Grenfell Herd Reindeer.

Photo by R. W. Brock.

By this time the land originally provided was not adequate for the proper care of the deer, and the financial resources of the Mission were not adequate to deal with the matter on a proper scale. The location which had been utilized up to this time was both limited in size and located in a comparatively closely populated section. The Newfoundland Government was approached with a view to taking over this work, but then the war broke out, and nothing was done. Furthermore, the local magistrates gave no assistance against poaching.

The herd suffered, therefore, in two ways, first, from being crowded, and from the development of an attack of some bronchial disease which carried off a number of the deer; and second, from the poaching which was carried on both by settlers and by fishermen, as the deer were close to the sea. A large number of deer were driven off into the hinterland.

In 1918, the remainder of the herd were given to the Canadian Government, and transported to the north shore of the Gulf of St. Lawrence, near St. Augustine. Here they at once began to increase in numbers.

I beg to quote a memorandum written by Dr. Grenfell, in January, 1917, as follows:—

“We have completely demonstrated here that the deer can be successfully installed and herded without undue cost; they can flourish and propagate on the natural food; needing none of the necessary provisions made for elk on the Rockies. Our herd of 250 rose rapidly to 1,200, and had we had any protection whatever from the Government against poaching, we should to-day have five thousand of the animals. The experiment is too large a one to be successfully initiated on any scale by a private individual. I have been obliged to economize to such an extent that we have been unable under the circumstances to protect them, or to keep them on the only available headlands where poachers could not get at them, or drive them. This, and the fact that we had to make use of almost barren promontories, made the deer all the wilder in trying to get them to better pastures, and large batches escaped to the south. Two winters ago I drove right into such a company far to the south of here, but was unable to drive them north again. This is a comparatively closely populated piece of land. The herd has never yet been tried in Labrador with its huge hinterland. There is no doubt in any of our minds but that they can flourish there.”

APPENDIX No. VI

REPORT OF C. C. PARKER, INSPECTOR OF INDIAN AFFAIRS FOR ONTARIO AND QUEBEC, TO THE DEPUTY SUPERINTENDENT GENERAL OF INDIAN AFFAIRS, ON THE HERD OF REINDEER TAKEN OVER FROM DR. GRENFELL AND MAINTAINED AT LOBSTER BAY, ON THE GULF OF ST. LAWRENCE.

OTTAWA, November 15, 1919.

SIR,—With reference to the herd of reindeer which we are maintaining at Lobster bay, I beg to report as follows:—

Following out instructions received at Quebec, while en route to the gulf, I succeeded in purchasing the quantity of wire fencing asked for and had it shipped on a steamer which at time of shipment, was supposed to be going to a point not far from Lobster bay. The steamer, however, on account of ice conditions, turned back from Harrington Harbour, where the wire was landed. Proceeding



Government Reindeer Herd, Lobster Bay.

—A. Living.

down the coast in the Department's boat, I endeavoured at several places to engage boats to transport the wire to its intended destination. This entailed considerable delay and proved unsuccessful as the fishing season was on, and no person would leave their traps for such a trip. In the meantime a steamer which was going as far as Mutton bay passed down and I arranged for the wire to be forwarded to that point. I finally reached Rocky bay without having found means of transport for the wire. After a few days at Rocky bay, I succeeded in engaging a large fishing boat and crew to make the trip, and the wire was landed

half at Rocky bay and half at Lobster bay. Posts for the fence had been cut and hauled during the previous winter, but no braces for the posts had been provided. I started the herders peeling the posts and distributing them across the peninsula which it was proposed to fence off, after first having selected the most favourable route. As the fence had to be erected, for the most part, over solid rock, making it impossible to sink the posts, it was essential that a large number of braces be used. It was impossible to obtain these locally so that I was obliged to have two boats with Indians start from St. Augustine and cut pieces on the way. The greater part of the coast is barren, and only in spots can poles be found. This was done, and by the time I left the fence was well under way, the work being done by the herders under the chief herder, Sam Fequet. The fence will require continual patrol and repairs in view of the nature of the ground over which it is constructed.

The former chief herder, Charles Bromfield, left the place the day I arrived, although he knew I was on my way and had communicated with him by wire from time to time. From his record, which I had learned from disinterested parties and other parties while en route and at Rocky bay, I felt that he was not trustworthy, and it was evident that he was extremely lazy. Under authority obtained from you by wire, I installed Sam Fequet as chief herder. Sam is a very energetic worker and appeared to be conscientious and anxious to do all possible to keep the deer herd intact. George Bromfield was allowed to go on account of ill health. This left only Sam Fequet and John Salvin as herders. I engaged Jack Welman to replace Bromfield.

Three Indian families had been moved to the place to assist in caring for the deer during the summer. The Indians had done fairly good work but were getting tired of it and wished to get back to St. Augustine to prepare canoes, etc., for the winter. I allowed them to return and gave orders to the Hudson's Bay Company to pay the three men at the rate of \$1.25 per day.

The deer are somewhat peculiar in their habits and the work of the herders is by no means easy. In the summer the deer invariably travel to windward. Fortunately the prevailing winds are from the southwest or southeast which brings the deer out to the headlands, where the various varieties of flies bother them least. During the night, however, when there is less wind they travel inland. The stags give the greatest trouble as they separate from the does during the summer. Before the fence was started the stags were usually found three miles, or more, inland by morning. Fortunately, they stay in a herd and can be driven in this way. When the wind comes off the land the herders are busy from morning to night and sometimes all night keeping the deer on the headlands. In view of the extremely rough nature of the country this is no easy task and entails much running over rocks and morass. The chief herder, up until the time I left, had naturally worn out eight pairs of sealskin boots. The dry moss on the rocks cuts the boots like knives. He had nothing left to wear when I was coming away, and I was obliged to leave him my long rubber boots. At Romaine, I purchased some sealskin boots and had them forwarded for the use of the herders. Their agreement calls for three pairs annually.

Counting the deer is not easy as they are continually moving. This had been neglected by the late chief herder. I instructed Fequet to see that a proper count was made at least once a week.

While at Rocky bay, I endeavoured to trace up the herd from the time it had been landed and to ascertain what had become of them. Starting with 126 deer landed, I found that three had died from injuries received during the trip.

Later on, one had its leg broken and was killed. Another had died in March from unknown causes. Four had got away during the winter and proceeded down to the coast. Five had gone inside during the winter, and Bromfield had gone after them. He returned saying that he could get no trace of them. A hunter told me that he had seen where Bromfield turned back, and that he was at the time on the deers' tracks. Later in the spring two old deer died with broken legs, and one fawn. Of those that got away and went down the coast, two were killed by Newfoundland fishermen. While I was at the place two fawns died, one having been killed by a herding dog, and the other from injuries received by falling and the other deer tramping on it. In one of these fawns some No. 2 shot were found. While the late chief herder claimed there were 42 fawns last spring, two of the herders claimed there were only 36. In this connection it might be mentioned that there would probably have been more fawns had the deer not been moved during the rutting season. It seems reasonable to expect more fawns next spring, as the rutting season will not be interfered with this fall. Allowing for 126 in the original herd and 36 fawns this spring would give a herd of 162. The loss of 19 are accounted for, which should leave a herd of 142, but there are actually only about 125 left according to the count of the chief herder from time to time. I am of the opinion that the others got away last winter as the herd was well controlled all summer.

During the summer, the deer were kept on the neck of land between Lobster and Rocky bays. This is a smaller area than the Lobster bay place and makes control easier during the summer months. In the winter they will be on the Lobster bay location. The fence was constructed on the Rocky bay place. There will be no fence on the Lobster bay winter park. To construct a fence there, would cost many times the value of the herd and be of little actual value during the winter months as the greater part would be snowed under. However, during the winter months the deer are more easily kept track of as their tracks can be seen and followed. There is abundant food for them there; and they have already selected several locations where they remain as a rule.

The deer are far from being domesticated. While the herders can approach them to some extent, they cannot go so close as to lay their hands on one. With a stranger they are quite wild. I experienced great difficulty in obtaining some rather unsatisfactory snapshots which are attached to this report. If they are to be domesticated in order that they may be used for milking and transportation purposes, it will be necessary to use Lapps, who understand them better and are accustomed to using them for domestic purposes.

In conclusion, I beg to make some suggestions which I trust will be acted upon. First, I have to urge that this Department be relieved of the responsibility of the herd, as we have no proper organization in that part of the country to carry on the work. The annual visit of an officer of the Department serves no practical purpose and does not protect the herd. The building up of a herd, to be of any value, will entail a large expenditure and continue for many years. I would suggest that the animal Parks Branch of the Interior Department be asked to take over the work. If this is not done, I would suggest that the matter be taken up with the Anticosti island people who are anxious to have the herd moved to the island, and will give guarantees as to protection and the handing over of a certain part of the increase, at some future time. On the island they would be quite safe.

If, however, it is decided that this Department must continue to care for the herd, then I would recommend that a warehouse be built at Lobster bay; that we stock it with our own provisions for the herders, and that a competent

officer be placed in charge to look after supplies and to have supervision over the herders. It will also be necessary to obtain Lapp families and to move them there. All this will entail much expenditure spread over a long period, and in the meantime there will be no revenue. It is absolutely useless for this Department to continue the responsibility of the herd unless we have a trustworthy, competent officer on the ground all the time. There should also be a very strict law against killing of the deer within the limits of the park or elsewhere. The Newfoundland fishermen are the worst offenders in this connection, and I look for further poaching this summer.

Each year that I have gone down the gulf I have been obliged to make considerable use of the Government telegraph line. It is the only means of quick communication and at times, almost indispensable. The service, however, has always been far from satisfactory and this summer was no exception. There is an office at Rocky bay, and I had expected to be able to send messages from there. During the seventeen days that I was there the operator only spent a few hours one day in the office. The rest of the time he was away fishing on another part of the coast. To get to an office meant a trip of about twenty miles. The operators are far from satisfactory, and I often have messages which it is impossible to read. In view of the fact that there is a Government industry at Rocky bay, I consider that better telegraph service should be provided at this point at least. I would also suggest that operators should be required to take an oath of secrecy with regard to messages. At the present time this is not always observed and business messages are discussed from place to place. In fact, the whole service is far from satisfactory. When it is considered that the telegraph line is about all the people of the coast have in the way of modern convenience, it does not seem unreasonable to ask that it be made as efficient as possible.

The supplies for the reindeer I ordered from Whiteley Bros., at Bonne Neperance, after learning from the Department that no supplies had been shipped by the Marine Department's steamer.

Herding dogs are badly needed. There is left only one dog of the three that came with the herd. This dog is now quite old and deaf, and is also becoming vicious. After he had killed one of the fawns, in spite of the fact that his incisors are filed off, I ordered him muzzled. It is almost impossible to herd the deer without dogs, and if we are to continue it will be necessary to provide herding dogs. Scotch collies would probably be suited for this work, especially if stock could be obtained from some farmer who has already trained them in herding sheep or cattle.

I have the honour to be,

Your obedient servant,

(Sgd.) PARKER,

Inspector Indian Agencies.

APPENDIX No. VII

SUMMARY OF REPORT OF EXPERIMENT IN CONNECTION WITH THE INTRODUCTION OF REINDEER INTO THE NORTH WEST TERRITORIES BY THE DEPARTMENT OF THE INTERIOR IN 1911 (LOCATION OF HERD AT FORT SMITH ON THE SLAVE RIVER).

- Early in summer of 1911 fifty (50) reindeer were purchased from Dr. Grenfell at \$51.30 per head.
- Herd consisted of six four-year-old stags, four gelded stags trained as sled deer, forty three to four-year-old breeding does.
- Arrangements made through Department Marine and Fisheries for transportation of animals from St. Anthony, Newfoundland, to Quebec.
- Voyage which should have taken four days was, owing to delays en route, extended to eleven days, during which time four (4) does died.
- On rail journey from Quebec to Athabaska Landing (stock car) four more deer died, one of these being a stag.
- From end of steel by wagon to Landing one doe died, the herd being thus reduced as at September 29, 1911, to forty-one head.
- Supply of reindeer moss was taken from Newfoundland, and this giving out at the end of steel and at Landing, green oats were procured.
- At Landing deer were shipped on scows—with remainder of moss and supply of green oats. From report received October 10, 1911, it would appear that great difficulty was experienced in securing moss, and between Fort McMurray and Fort Chipewyan six more deer died, leaving thirty-five. More moss was found about ten miles from Fort Chipewyan, but two more deer died at camp twelve miles from that Fort, reducing the herd to thirty-three.
- At May 15, 1912, the herd had been still further reduced to thirty-one, one sled deer having been drowned and one doe strayed.
- About May 20, 1912, herd was moved to Camp No. 2, on Whitefish lake, about twenty-five miles east of Fort Smith.
- From March, 1912, to May 23, 1912, the Chief Herder complained of trouble with flies, as the deer were liable to scatter, and on his request a fence was erected on the landward side of the promontory on which the camp was situated to prevent the deer scattering in this way.
- On July 10, 1912, the deer were reported to have stampeded owing to the heat and flies, and in November of the same year only twelve had been found, and on January 7, 1913, another was reported strayed (all the bucks and trained sled deer being lost), the herd being now reduced to eleven does.
- On May 29, 1913, the eleven does were brought to Camp No. 3, on the east side of Slave river, half-way between Fort Smith and Smith Landing to a point called Mountain Portage.
- On June 6, 1913, the deer again stampeded on account of flies, and being fenced in on land side, all but three swam the rapids and got away. One was later recovered, and the four (4) does were taken to Fort Smith to a corral at the Indian Agency called Camp No. 4.

REINDEER AND MUSK-OX

On August 25, 1913, in absence of herders, another doe was killed by dogs, leaving three of original lot.

Under date of September 5, 1913, seven of the strays were found and brought in by the herders, making ten in all, all of this number being does.

On October 2, an undescribed disease broke out among the remainder of the herd, from which seven died and the three does still remaining were moved to Camp No. 5, described as a slough back of Fort Smith. No description of disease is given and no remedial measures appear to have been taken.

APPENDIX No. VIII

SUBMISSION OF THE REVEREND W. G. WALTON, MISSIONARY,
CHURCH OF ENGLAND, STATIONED AT FORT GEORGE ON
JAMES' BAY, UNGAVA.

May 24, 1920.

SIR,—In accordance with your wish, I beg to set before you a few facts indicating why I think that the east coast of Hudson and James bays is a suitable place for testing an experiment in the raising of domesticated reindeer. The grounds on which I base my plea are threefold: (1) The needs of the Indians and Esquimaux of that territory, and the humanitarian call of these people to their fellow citizens of Canada to meet these needs: (2) The relief that reindeer will offer in the face of starvation and crime resulting from desperate food shortage: (3) The advantages which the locality offers for the successful raising of reindeer in unlimited numbers.

I. THE NEED OF THE PEOPLE

The necessities which arise among people who depend entirely upon the chase are at times such that no skill or diligence can provide against them. With the best hunters, even when game is ordinarily plentiful, there is great divergence in the quantity of the "take." There arise, however, conditions from time to time when all effort fails. Food animals or birds may for a season change their feeding range. Disease may sweep through them and to a large extent wipe them out of existence. Late severe frosts may destroy the eggs of game birds and thus spoil the hatch. Many vicissitudes arise that are appreciated by sportsmen and militate against the taking of food and the capturing of fur, and these are the sole means of support upon which my people subsist. I have lived amongst these people for twenty-seven years and know their circumstances and spirit thoroughly, and I know that there come times when hunger and starvation is under present conditions unavoidable. That starvation does occur let me give some specific instances.

In the winter of 1892-3, 150 Indians starved to death south of Fort Chime. This is corroborated by the late Mr. A. P. Low, of the Dominion Geological Survey of Ottawa, who visited that post. In the same winter eight Indians started inland from Cape Jones on a hunting expedition to seek the fur that could not be found on the coast. Only one of the party survived, and it was currently believed that he only subsisted by eating the bodies of those who fell by the wayside.

In January, 1893, I met at East Main river an Indian youth who had escaped starvation only through feeding upon the bodies of other members of his family. Although he never acknowledged this to me, he confessed to a missionary at Rupert House who told me of it. When I first entered the Mission in 1892, stories of cannibalism were commonly current, but of this I had no other evidence of their truth than the stories of the people and the traders whose veracity under the circumstances I had no reason to doubt.

During my time from 1895 to 1905 there were three outstanding instances of crime. In one season it was reported to me that thirteen Esquimaux were killed, in another season nine, and a third seventeen. Mr. A. A. Chesterfield, a Hudson bay trader, wrote a fiction story for one of the magazines based on the killing of the latter seventeen persons.

In the winter of 1911-12, an Esquimaux woman and two young daughters perished eighty miles north of Great Whale river trading post. In the spring the bones of the children were found piled in such a way that only human hands could have laid them there. Near by was found the half-eaten body of the mother. The manifest conclusion was that the mother had lived for a time on the flesh of her children, and then starved to death. When found, the foxes had partly devoured her body.

In 1902, measles broke out at Fort George, my own headquarters, and while only seventy-three deaths were reported at first, the actual number was nearer one hundred. There was no food to feed the sick, and no capacity to properly care for them. To the limit of my power I fed and cared for those within reach, and estimate that I was thus the means of helping sixty people, many of whom would otherwise have perished.

In 1916, eleven Indians starved to death inland from Richmond gulf. Two boys were sent to the post for help, but they returned with none. Three Indians starved to death inland from Great Whale river, and nine from Fort George.

The winter of 1918-19 was one of the hardest seasons in the memory of this generation owing to the scarcity of rabbits, ptarmigan and other food. A family of five died of starvation north of Great Whale river. During this winter an Esquimaux was killed by his neighbours on the south Belcher islands. I personally investigated the case last summer, and it seemed to be a matter of self defence.

While I have given many instances of crimes and suffering extended over a quarter of a century, I want it distinctly understood that the spirit that has been gradually developed in these people through Christian missionary influence is the subject of wonder and admiration to explorers and travellers from the outside world.

II. RELIEF THROUGH REINDEER

It is hardly necessary for me to enlarge upon the relief that would inevitably come to these people through the introduction of the reindeer in sufficient numbers. It is obvious that the reindeer would furnish a reserve of food that would always be available in case of distress, and, ultimately, they would be the staple article of diet when the supply became sufficiently abundant. They would furnish the skin clothing that is absolutely essential for life in snow houses and the extreme exposure to which the Esquimaux have to submit in their seal hunting in winter. They would furnish milk for the children and lower infant mortality. They would also furnish transportation facilities, not only for the natives but for the explorers and the prospectors, the carrying of the mail, the carrying of the doctor to his patients, and the police in search of the criminal, to say nothing about aiding the missionary in his work of mercy. In my judgment, no policy of relief however generous can permanently solve the difficulty of food supply unless that food is grown on the territory, and I see no other suggestion that can compare in reasonable promise with the introduction of the domesticated reindeer within our area.

III. SUITABLE AREA FOR THE EXPERIMENT

I am assuming that the Government of Canada is about to experiment on a large scale in the breeding and development of reindeer somewhere in the northern latitudes of this Dominion. I, of course, am not an authority on the conditions existing in Baffin Land, the west coasts of Hudson bay or the MacKenzie river district, but I do know the territory in which, and the people among whom, I have lived for nearly three decades. In the first place the great inland reaches of barren lands that stretch from off the coast of Hudson's bay clear across the Ungava peninsula to the Labrador have in time past been the feeding grounds for hundreds of thousands of wild caribou, an animal closely allied to the Siberian reindeer. Indians and Esquimaux with whom I am familiar, and who are perfectly reliable, have told me that some forty years ago that country was literally alive with caribou. They speak of the hoof beats of these vast migrating herds as the rumble of distant thunder. Trails leading to watering places are still plainly visible, and written documents of traders and hunters, two of which were copied by the reporter at our meeting on the 8th instant, corroborate the testimony of the natives and the evidences of the senses. These animals suddenly disappeared and the cause is still more or less of a conjecture. Some think it was an epidemic of disease. Others think it was a forest fire to the south whither the deer came to feed upon the foliage in summer. Whatever the cause, for many years they have never returned. The food remains. The climate has not changed. Where the caribou once thrived in numberless abundance, the reindeer may reasonably be expected to flourish.

In the next place, the native Esquimaux could soon be taught to herd and develop the reindeer. These people are particularly intelligent, quick to learn, ambitious to better their position. I refer to those who have come under the influence of Christian civilization. The Esquimaux in my district can be depended upon absolutely to do what is expected of them under my authority.

Further, the feeding grounds are removed from the vicinity of native dogs, poachers or sportsmen, a menace which I understand was the cause of great loss to the Grenfell experiment. There are now but very few wolves in that area although, I suppose, they are liable to come when the reindeer appear. In that respect it might share this nuisance with other places.

Finally, while the territory I speak of is isolated up to a certain point, it is fairly accessible to the railway at Cochrane in the south, and by water through the straits to the north.

There are many aspects of this subject that form interesting points of discussion, but they cannot be dealt with here. May I just say in conclusion that the development of important mineral resources in that territory may come at no distant date, and the adequate and successful development of the reindeer may hasten the development of many valuable commercial enterprises.

Yours faithfully,

(Sgd.) REV. W. G. WALTON,

*Care The Missionary Society of the Church of
England in Canada.*

*131 Confederation Life Bldg.,
Toronto, Ont.*

APPENDIX No. IX

MEMORANDUM ON BARREN LAND CARIBOU AND MUSK-OX

Prepared by Dr. R. M. Anderson, Chief of the Southern Party, Canadian Arctic Expedition, 1913-1916, from information secured from Captain Joseph P. Bernard, Commanding the Schooner "Teddy Bear," recently returned from four years voyage into Coronation Gulf and Victoria Island Region.

OTTAWA, CANADA, January 24, 1921.

DEAR SIRs,—I am enclosing a memorandum on Barren Ground caribou and musk-ox, which Mr. Harkin asked me to prepare from the notes I got by interviewing Captain Joseph F. Bernard, of Tignish, P.E.I., when he was in Ottawa last month, after a four years' voyage into the Coronation gulf and Victoria island region in his schooner *Teddy Bear*. Captain Bernard is a trustworthy and observant citizen, and his information is of great interest on account of showing the very rapid changes which are taking place in the habits of the natives and the consequent destruction of game in the region which he visited very recently. As an illustration, he told me that there were still a good many bows and arrows in use in Coronation gulf in 1917, but in 1919 there were only two or three bows in use, so far as he could find out. The natives now practically all have high-power rifles, and are using them freely.

Yours sincerely,

(Sgd.) R. M. ANDERSON.

REPORT OF THE ROYAL COMMISSION

MEMORANDUM ON BARREN GROUND CARIBOU AND MUSK-OX
(R. M. Anderson)

BARREN GROUND CARIBOU—*Rangifer arcticus* (Richardson)

Notes from Captain Joseph F. Bernard, of Schooner "Teddy Bear," at Ottawa, December, 1920.

After several years trading in the Bering sea region, Captain Bernard went into the Arctic in 1909, wintering at Barter island, 1909-10; at mouth of Kogaryusk river, eighteen miles east of Coppermine river, Coronation gulf, 1910-11; at Cape Bathurst, 1911-12; at Bernard harbour, Dolphin and Union strait, 1912-13 (on south side of the strait); at Lady Richardson's bay, southwest side of Victoria island, 1913-14; went out to Nome in 1914. Sailed in again from Nome in 1916, wintering 1916-17 at Kogaryusk river again; in late summer of 1917, finding ice conditions bad in Dolphin and Union strait, he sailed east and found little ice in Dease strait and in Queen Maud's sea. Turning up into



Caribou near Carey Lake, N.W.T.

Photo by J. B. Tyrrell.

Victoria strait, he was blocked in by ice behind Taylor island, off southwestern side of Victoria island (ca. 102° west, 69° 15' north) and could not get out of the place for over two years. 1918 was a bad year; snow did not go off the land except on the higher ridges and ice was four feet thick in harbour at end of summer. 1919 the climatic conditions were better, although the ice was then ten feet thick, and sunshine most of the summer melted the ice so Bernard got out of Victoria strait on September 1, 1919, having only time to get back west to the Kogaryusk river in fall of 1919. He wintered again at Kogaryusk, 1919-20, and came out to Nome again in September, 1920.

Migration of Caribou—

1916 (autumn migration). At Kogaryusk, eighteen miles east of mouth of Coppermine river. Biggest migration at Big Kogaryusk, west of Tree river (in the fall). No caribou at Coppermine river that fall; few at Cape Krusenstern (east end of Dolphin and Union strait) or at Bernard harbour (south side of Dolphin and Union strait).

1917 (spring migration). At Kogaryusk, few; some down the Coppermine river and scattered all over Coronation gulf.

1917 (fall). Bernard moves east to Taylor island, Victoria strait, off south-eastern shore of Victoria island, about 102° west, lat. 69° 15' north, west of King William island. Knows nothing about migration in Coronation gulf that fall. A few caribou on Taylor island and the adjoining mainland of Victoria island; some remained all winter.

1918. Hearsay for Coronation gulf. Otto Singer, trader, told Bernard that at Hepburn island, Coronation gulf, caribou were plentiful in the fall of 1918, and extremely plentiful also in spring of 1919. They were plentiful at Tree river (Port Epworth) in fall of 1918. In fall of 1918 there were no caribou at mouth of Coppermine, according to Captain Klengenberg, and Klengenberg's people had to go to Big Kogaryusk to get meat.



Caribou near Carey Lake, N.W.T.

Photo by J. B. Tyrrell

1919 (fall). Caribou extremely scarce all along coast (Coronation gulf). None at Kogaryusk, where Bernard was wintering again. The R.N.W.M.P. detachment at Tree river, Coronation gulf (Inspector Clay, etc.), had a bunch of natives out hunting, but scarcely got enough meat for themselves. Few caribou at Hepburn island. A few at Big Kogaryusk, west of Tree river. At Bernard harbour, Dolphin and Union strait, caribou were fairly plentiful.

1919-20. All winter caribou were found in pretty large numbers back of Back's inlet, southwest corner of Coronation gulf. No caribou around the lower Coppermine in 1919-20, while plenty at Back's inlet. There were a few for about three weeks in spring of 1920 in valley of (Little) Kogaryusk. Caribou were plentiful at Dismal lake. Several Copper Eskimos spent the winter trapping around Dismal lake and shot plenty of caribou.

I did not question Captain Bernard on the caribou prior to summer of 1916, because I had the data for that region in my own field notes from 1910 to summer of 1916. (R. M. Anderson).

Bernard says that there is a considerable migration across Coronation gulf, although somewhat variable, between the mouth of the Coppermine river east to Cape Barrow; also from Bathurst inlet.

Captain Bernard wintered at Kogaryusk river, Coronation gulf, 1916-17, and at Taylor island, 1917-18-19, and at Kogaryusk river again 1919-20.

The ice in McClintock channel was very rough, moving in the centre until midwinter. Few, if any, caribou cross Queen Maud's sea as the ice is too rough. The greatest migration of caribou in that region is across Dease strait from Kent peninsula to Victoria island, and vice versa. There are caribou on the mainland east of the Kent peninsula all winter. The caribou from that region migrate northeast to King William island and Boothia peninsula.

There are some caribou all winter on the "Victoria Land peninsula," of southeastern Victoria island. Bernard got caribou all winter on Taylor island, and the mainland (of Victoria island) near there. Bernard says there are no enormous numbers of caribou anywhere he has ever been. The caribou move about in small herds.

The natives have practically all been armed with rifles within the past four years. Few posts of the Hudson's Bay Company at Bernard harbour, Coppermine river, Tree river, and Kent peninsula. At the present rate of slaughter Bernard believes that there will be no caribou left within ten years.



Summer migration, Copper Eskimo—Coppermine River (note summer vegetation).

The trader for the Hudson's Bay Company (Pete Norberg) on Kent peninsula has induced most of the natives to quit seal hunting in winter, and to live on the land and trap foxes in winter. He hires some natives to hunt seals on the ice in the spring, buys the blubber, and supplies Eskimo trappers with blubber in the fall so they can live on the land.

These natives (around Kent peninsula) now live on caribou meat in the winter instead of seal meat. Formerly they lived on the ice from December to May, and killed no caribou at that season. They also are shooting down all the caribou they can in the fall and winter, and only use some of the meat. They kill all the animals they can as the carcasses attract foxes on the land. Two thousand foxes were taken from the Kent peninsula (white or Arctic foxes), 1919-20, Norberg got most of them, but Klengenberg and his agents got a few hundred of them. Klengenberg has several boys (half-breeds) big enough to trap, and they are established at sub-stations for trapping and trading.

There were few caribou at the Kogaryusk in fall of 1916, but some in 1917. In 1919 about 400 crossed there. Practically no caribou crossed Bernard harbour in fall of 1916.

A number of Copper Eskimos, Kemirk and others, went inland and wintered at Dismal lake in 1919-20, trapping foxes and living on caribou. Ikey (Ikey Belt or Angotitsiak), Point Hope, Alaska, native, who came in with Canadian Arctic Expedition in 1914, and another native killed 75 caribou in a week, west of the mouth of the Coppermine river in early spring of 1920. They needed most of the meat, as several families were living on caribou meat. They eat enormous quantities when living on lean caribou meat. Caribou are mostly poor at that season, being largely cows near calving time.

A few natives were sealing in winter (1919-20) in Dolphin and Union strait and the west end of Coronation gulf, but all of them quit sealing two months earlier than they used to. They trapped foxes heavily in March and April, and well into the month of May.

Some of Klengenberg's family, and other natives, spent part of the winter, two or three years ago, thirty or forty miles back up the Coppermine river, within the timber belt, and trapped eleven cross foxes and some other fur. This region has never been trapped before. It used to be a good wintering place for caribou, viz., 1911, 1914, 1915 and 1916 (according to my own experience).

Captain Bernard says that the natives of Adelaide peninsula region are larger and stronger than the Coronation gulf region. They kill some caribou, but live more largely on fish. The Eskimos in that region are badly infected with syphilis, which came from Hudson bay region. He only noticed one case west of there, *i.e.*, one woman in Bathurst inlet who had come from Hudson bay. Tuberculosis seems to be coming into Coronation gulf, Bernard thinks from their now frequent meetings with Great Bear Lake Indians. A large party of Dog-Ribs (7) from south of Great Bear lake came down to the coast two or three years ago to trade with Klengenberg. These Indians had never done so before, as they were afraid of Eskimos.

Different Kinds of Caribou—

Captain Bernard thinks that there are two different kinds of caribou in the region about the mouth of the Coppermine. The smaller, whiter animals are the ones that come across from Victoria island in the fall and go back in the spring. Some of them may remain on the mainland all summer, however. He has seen larger, darker, animals up the Kogaryusk river in the spring. He thinks that these may be the variety which winters farther inland and comes back toward the coast in the spring. The smaller variety probably does not go very far inland south of Coronation gulf and south of Dolphin and Union strait in winter.

The above coincided with my own view that the caribou wintering around east end of Great Bear lake (Caribou point, Dease river, etc.) are larger and darker, with shorter heads than the Coppermine river winter caribou. The Bear lake caribou go a ways north in summer, to Dismal lake and beyond, also the "caribou ground" of the Indians outside of the timber north of Great Bear lake. That is, the winter ground of the Victoria island caribou overlaps the summer range of the Great Bear lake caribou. Presumably some of the caribou which summer around Great Bear lake go south in winter to Great Slave lake, etc., to the type locality of *arcticus* (Fort Enterprise region). The big migration which Mr. Stefansson reported on Dease river in 1919, in October, was too early to be composed of animals which come from Victoria island, as the latter cannot cross the strait or gulf until November.

REPORT OF THE ROYAL COMMISSION

MUSK OX (*Ovibos moschatus*)

Victoria Island—

Captain Bernard says that the last musk-oxen were killed on southeastern Victoria island in 1914-15. Eskimos who had recently obtained guns were chasing a polar bear north of Taylor island, Victoria strait, found musk-oxen and killed some. The next year they went back and killed every musk-ox, some on the mainland, and others on what Bernard thought to be Gateshead island. He had been some distance up the coast with some of those natives, and they had stated that this island was only two or three days' travel farther.

Captain Bernard says that the Eskimos are killing no musk-oxen on the Kent peninsula because none are left. There are no musk-oxen near the coast of Adelaide peninsula, south of King William island. The natives east of the Natchillingmiut (King William island) have been supplied with knives and iron for many years, beyond the memory of the oldest inhabitants. Also, many of them have had guns for a long time. They have been supplied from Hudson bay along the Arctic coast, through the Aiwillikmiuts. This is the common trade route from east to west. Practically nothing goes over land, via Ark-i-linik and Backs river, to Victoria island, as Stefansson imagined. The Ekalluktok river also empties into Wellington bay, north side of Coronation gulf, instead of into Albert Edward bay on southwest end of Victoria island, as Stefansson supposed.

Bernard says that dried musk-ox meat is tasteless; natives told him that meat of some old bulls is too strong to eat. Says "you can imagine what it would be if natives say that."

Bernard thinks there are still a few musk-oxen on the mainland east of Tree river and south of Arctic sound. The natives bring in a few fresh skins. At the time he came back from the east in 1919, neither he nor the natives knew that trade in musk-ox skins was illegal. With the new habits of the Eskimos of the region, that is, going inland to trap and hunt in winter, well supplied with rifles and ammunition, the musk-oxen will soon be killed off in that region.

(The Eskimos in that region told me in 1911 that they seldom killed musk-oxen, because they were afraid to attack them with bow and arrows; also that they never hunted inland in winter. All the musk-oxen at that time were found incidentally when on the summer caribou hunts, and were generally stray bulls, as the Esquimaux did not care to attack herds.—R. M. A.)

APPENDIX No. X

REINDEER IN SIBERIA

Extract from Chapter XVIII of "The Cruise of the Corwin," by John Muir, Boston, 1917.

STEAMER "CORWIN," Plover Bay.

This morning a party from the ship went to the head of the bay under the guidance of a pair of Chukchis to see a herd of reindeer that they told us was there. The distance, we found, is about eighteen miles from the lower harbour, where the *Corwin* is at anchor. The day was fine and we enjoyed the sail very much, skimming rapidly along in the steam launch over smooth water, past the huge ice-sculptured headlands and mountains that formed the walls, and the deep canons and valleys between them that swept back to clusters of glacial fountains. The naturalist made desperate efforts now and then to obtain specimens of rare auks, petrels, ducks, etc., which were flying and swimming about us in great abundance, making lively pictures of happy, exuberant life.

The rocks bounding the bay, though beautiful in their combinations and collections of curves and peaks, inflowing and touching delicately, and rising in bold, picturesque groups, are, nevertheless, intensely desolate looking for want of trees, shrubs, or vegetation dense enough to give colour in telling quantities, visible at a distance. Even the valleys opening back from the water here and there are mostly bare as seen at the distance of a mile or two, and have only faint tinges of green derived from dwarf willows, sedges, and heathworts that creep low among the stones. Yet here, or in the larger valleys adjacent, where the main tributary glaciers came into the Plover bay trunk, and in other valleys to the northeastward, large herds of reindeer, wild as well as tame, find sustenance, together with a few wild sheep and bears.

On the terminal moraine of the ancient glacier that formed the first main tributary of the Plover bay glacier, some four miles from the extreme head of the bay, we noticed two small skin-covered huts, which our guides informed us belonged to the reindeer people we were seeking, and that we should certainly find them at home, because their herd was only a little one and found plenty of weeds and moss to eat in the valleys behind their huts without going far away, as the people had to do who owned big herds. At two days' distance, they said, where the valleys are wide and green, with plenty to eat, there is a big herd belonging to one of their friends, so big that they cover all the ground thereabouts; but the herd we were to see was only a little one, and the owner was not a rich man.

As we approached the shore, a hundred yards or so from the huts, a young man came running to meet us, bounding over the moraine boulders, with easy strength as if his limbs had been trained on the mountains for many a year, until running had become a pleasant indulgence. He was presently joined by three others, who gazed and smiled curiously at the steam launch and at our party, wondering suspiciously, when the interpreter had told our object, why we should come so far and seem so eager to see their deer. Our guides, who, of course, understood their prejudices and superstitions, told them that we wanted a big, fat deer to eat, and that we would pay them well for it—tobacco, lead, powder,

caps, shot, calico, knives, etc., told off in tempting order. But they said they had none to sell, and it required half an hour of cautious negotiation to get them over their suspicious alarms, and (to induce them to) consent to sell the carcass of one, provided we would leave the skin, which they said they wanted to keep for winter garments.

Then two young men, fine, strapping, elastic fellows, threw off their upper parkas, tied their handsomely embroidered moccasins firmly across the instep and around the ankle, poised their long Russian spears, which they said they always carried in case they should meet a bear or wolf, and away they sped after their herd up a long, wide glacier valley along the bank of a stream, bounding lightly from rock to rock in easy poise, and across soft bits of tundra and rough sedgy meadows with long, heavy, undulating strides. Their gait, as far as we could see, was steadily maintained and was admirably lithe and strong and graceful. Their small feet and ankles and round tapered shanks showed to fine advantage in their tight-fitting leggings and moccasins as they went speeding over the ground like trained racers glorying in their strength. We watched them through field-glasses until they were about three miles away, during which time they did not appear to slacken their pace a single moment. They were gone about three hours, so that the herd must have been at least six or seven miles from the huts.

In the meantime we ate luncheon and strolled about the neighbourhood looking at the plants, at the views down the bay, and at the interior of the huts, etc. We chatted with the Chukchis about their herd, about the wild sheep on the mountains, the wild reindeer, bears, and wolves. We found that the family consisted of father, mother, a grown daughter, and the boys that were after the deer. The old folks were evidently contented and happy in their safe retreat among the hills, with a sure support from their precious herd, and they were proud of their red-cheeked girl and two strapping boys, as well they might be; for they seemed as healthy and rosy and robust a group of children as ever gladdened the heart of Chukchi parents. The boys appeared to be part owners of everything about the house, as well as of the deer, for in looking through the huts we saw a few curious odds and ends that we offered to purchase, but were told, in most cases, that they could not sell them until the boys came back.

After we had watched impatiently for some time, the reindeer came in sight, about a hundred and fifty of them, driven gently without any of that noisy shouting and worrying that are heard in driving the domestic animals in civilized countries. We left the huts and went up the stream bank about three quarters of a mile to meet them, led by the owner and his wife and daughter, who carried a knife and tin cup and vessels to save the blood and the entrails—which stirred a train of grim associations that greatly marred the beauty of the picture.

I was afraid from what I knew of the habits of sheep, cattle and horses that a sight of strangers would stampede the herd when we met. But of this, as it proved, there was not the slightest danger; for of all the familiar, tame animals man has gathered about him the reindeer is the tamest. They can hardly be said to be *domesticated*, since they are not shut in around the huts, or put under shelter either winter or summer. On they came, while we gazed eagerly at the novel sight—a thicket of antlers, big and little, old and young, led by the strongest, holding their heads low most of the time, as if conscious of that fact that they were carrying very big, branching horns. A straggler fell behind now and then to cull a choice mouthful of willow or dainty gray lichen, then made haste to join the herd again.

REINDEER AND MUSK-OX

They waded across the creek and came straight toward us, up the sloping bank where we were waiting, nearer, nearer, until we could see their eyes, their smooth round limbs, the velvet on their horns, until within five or six yards of us, the drivers saying scarce a word, and the owner in front looking at them as they came up without making any call or movement to attract them. After giving us the benefit of their magnificent eyes and sweet breath they began to feed off back up the valley.

Thereupon the boys, who had been loitering on the stream-side to catch a salmon trout or two, went around them and drove them back to us. Then the deer stopped feeding and began to chew the cud and to lie down, with eyes partly closed and dreamy-looking, as if profoundly comfortable, we strangers causing them not the slightest alarm though standing nearly within touching distance of them. Cows in a barnyard, milked and petted every day, are not so gentle. Yet these beautiful animals are allowed to feed at will, without herding to any great extent. They seem as smooth and clean and glossy as if they were wild. Taming does not seem to have injured them in any way. I saw no mark of man upon them.

They are not so large as I had been led to suppose, nor so rough and bony and angular. The largest would not much exceed three or four hundred pounds in weight. They are, at this time of year, smooth, trim, delicately moulded animals, very fat, and apparently short-

winded, for they were breathing hard when they came up, like oxen that had been working on a hot day. The horns of the largest males are about four feet long, rising with a backward curve, and then forward, and dividing into three or four points, and with a number of short palmated branches putting forward and downward from the base over the animal's forehead. Those of the female are very slender and elegant in curve, more so than any horns I have seen.



Reindeer—"Horns in the Velvet."

Courtesy of Carl Lomen, Nome, Alaska.

This species of deer is said to be the only one in which the female has horns. The fawns, also, have horns already, six inches to a foot long, with a few blunt, knobby branches beginning to sprout. All are now in the velvet, some of which is beginning to peel off and hang in loose shreds about the heads of some of them, producing a very singular appearance, as if they had been fighting a rag-bag.

The so-called velvet is a close, soft, downy fur, black in colour, and very fine and silky, about three-eighths or half an inch long, with a few hairs nearly an inch in length rising stiffly here and there over the general plushy surface. All the branches of their horns are covered, giving an exceedingly rich and beautiful effect. The eyes are large, and in expression confiding and gentle. The head, contrary to many preconceived notions derived from engravings, is, on the whole, delicately formed, and muzzle long and straight, blunt and cow-like. The neck is thin, tapering but little, rather deep, and held, while standing at ease, sloping down a little, and the large males have long hair on the under side. The body is round, almost cylindrical—the belly not at all bloated or bent out like that of a cow. The legs are stout, but not clumsy, and taper finely into the muscles of the shoulders and hips. The feet are very broad and spreading, making a track about as large as a cow's. This enables the animal to walk over boggy tundras in summer and over snow in winter.

In colour they vary as much in some specimens as do cattle and horses, showing white, brown, black and gray at the same time. The prevailing colour is nearly black in summer, brownish-white in winter. The colours of the tame animals are not so constant as those of the wild. The hair is, when full grown, very heavy, with fine wool at the bottom, thus making a warm covering sufficient to enable the animal to resist the keenest frosts of the Arctic winter without any shelter beyond the lee side of a rock or hill.

After walking through the midst of the herd, the boys selected a rather small specimen to be killed. One caught it by the hind leg, just as sheep are caught, and dragged it backward out of the herd; then the other boy took it by the horns and led it away a few yards from the herd, no notice being taken of its struggles by its companions, nor was any tendency to take fright observed, such as would, under the circumstances, have been shown by any of the common domestic animals. The mother alone looked after it eagerly, and further manifested her concern and affection by uttering a low, grunting sound, and by trying to follow it.

After it was slain they laid it on its side, one of the women brought forward a branch of willow about a foot long, with the green leaves on it, and put it under the animal's head. Then she threw four or five handfuls of the blood, from the knife-wound back of the shoulder, out over the ground to the southward, making me get out of the way, as if this direction were the only proper one. Next she took a cupful of water and poured a little on its mouth and tail and on the wound. While this ceremony was being performed all the family looked serious, but as soon as it was over they began to laugh and chat as before. The herd, during the time of the killing and dressing, were tranquilly chewing their cud, not noticing even the smell of the blood, which makes cattle so frantic.

One of our party was anxious to procure a young one alive to take home with him, but they would not sell one alive at any price. When we inquired the reason they said that if they should part with one, all the rest of the herd would die, and the same thing would happen if they were to part with the head of one. This they excitedly declared was true, for they had seen it proved many

times though white men did not understand it, and always laughed about it. When we indicated a very large buck and inquired why they did not kill that big one, and let the little ones grow, they replied that that big fellow was strong, and knew how to pull a sled, and could run fast over the snow that would come by-and-by, and they needed him too much to kill him.

I have never before seen half so interesting a company of tame animals. In some parts of Siberia reindeer herds numbering many thousands may be seen together. In these frozen regions they supply every want of their owners as no other animal could possibly do—food, warm clothing, coverings for their tents, bedding, rapid transportation, and to some extent, fuel. They are not nearly so numerous in the immediate vicinity of the bay as they once were, a fact attributed to the sale of several live specimens to whalers.

APPENDIX No. XI

LAPP IMMIGRATION TO NORTHERN CANADA AND LAPPS AS
HERDERS OF REINDEER

Memorandum prepared by Mr. Commissioner Harkin, embodying excerpts from letters addressed by Dr. Grenfell to Mr. Jose Machado, Secretary of the Canadian Branch of the International Grenfell Association, also from certain correspondence passing between Mr. W. Kjellmann, of Los Angeles, California, and the National Parks Branch of the Department of the Interior.

April 21, 1921.

MEMORANDUM:

A suggestion has been made that the development of the reindeer industry in Canada could be promoted by arrangements by which reindeer-owning-Lapps in Alaska and Lapland could be located on suitable areas in that part of Ungava bordering on the northeast coast of the Gulf of St. Lawrence. The suggestion was first made by Wm. Kjellmann, of Los Angeles, California, who was associated for a time in United States Government reindeer enterprises in Alaska. He made the suggestion to Dr. Grenfell, of the Labrador Medical Mission, and it was transmitted by him through Mr. Jose Machado, Secretary, Canadian Branch of the International Grenfell Association, to the Department of the Interior.

The following is an extract from a letter written by Dr. Grenfell on February 24, 1921, to Mr. Machado:—

"I wish you would at once put the Department of the Government in touch with this man. It is exactly what we want in Canadian Labrador. The land north of Harrington and all the way along that coast from Cape Whittle to St. Augustine is just perfect for deer raising. I wish the Canadians would at once get in touch with the Lapps and get them to come over and bring a whole heap of deer. It would well repay outlay of their transportation in time, for natives would then get herds. There are millions of miles of reindeer moss barrens, and other adaptable vegetation. I feel sure Labrador, especially Canadian Labrador, is the best adapted country for deer food in the Dominion."

The following is an extract from a further letter written by Dr. Grenfell on March 21, 1921, to Mr. Machado:—

"*Re* Kjellmann: He is really intensely interested in the deer. He knows the Lapps well. He says all the reindeer ground in both Sweden and Norway is now taken up. Herds can't expand for want of mileage. The Lapps have written him they want to bring herds over. It would be ideal for Canada, and I think the Federal Government should certainly help them with transportation. He says the markets also are too far from Lapland, and that big companies have to buy 10,000 to 20,000 and kill and freeze them for export. He says one Lapp friend of his in Alaska took on loan 100 deer from the United States Government in 1901, and up to date has sold 7,000 deer from them, at average value of \$22.

"He agrees entirely that Quebec, just north of the gulf in the high barren lands between Harrington and Blanc Sablon, would be an ideal ground for the deer. I know that's the place, though Stefansson wants to take them all north. Kjellmann knows all about it. It is so easy to get the deer to where ours are—such a lovely place to live for herders—and also such a good place for markets. The deer could haul meat to the line, or a steamer or two could carry carcasses."

The following are extracts from a letter from Mr. Kjellmann to myself, dated April 6, 1921:—

"My enquiry was not for any special section, but to obtain general points from the entire moss-bearing belt of Canada. I do not expect to find the north shore of St. Lawrence bay especially adapted for reindeer raising, while further inland on the peninsula, between the Atlantic and the Hudson bay, I expect conditions to be very favourable in general.

"Conditions in Lapland make it necessary for many of the Lapps to seek new fields of endeavour to obtain a living.

"Some years ago the Norwegian and Swedish Governments appointed a joint commission to work out a solution of the reindeer problem. The commission sectionized the entire pasture area in the two countries and set a limit to the number of animals to be allowed in each section; this limit has been reached, hence no further increase of herds is possible. Unfortunately, the commission did not limit the increase of Laplanders, therefore an over-supply of people who have to seek new fields.

"In Alaska the condition is vice versa, namely, an over-supply of reindeer for the consumption of home markets; for this and other reasons, some of the Lapps there wish to change.

"By mixing the two conditions each one would remedy the other, and Canada would profit by the mixture; but in this matter, like everything else—no profit without effort.

"It would be mere guess work to state the number of people who would move if the condition was favourable—my guess is several hundred from Lapland. In 1898, it took us but two weeks to gather 175 of them and have them on their way out of their country.

"Alaska has only a few—perhaps four to eight families. Their herds would aggregate about 8,000 to 10,000 head, which could be augmented by purchase if desired."

APPENDIX No. XII

LAPPS AND REINDEER IN SWEDEN AND NORWAY

Memorandum prepared for the use of the United States Bureau of Education by Mr. Hjalmar Lundbohm, Delegate of the Royal Swedish Government, and appearing in Bulletin No. 4 of the United States Department of the Interior, 1919.

Most of the figures and some of the information in regard to Sweden were gathered by a commission which at present is negotiating with a Norwegian commission in order to settle the difficulties which are always to be found when Swedish Lapps migrate into Norway. The figures are furnished by the forester, Mr. Avid Montell, who is a member of the commission.

The Norwegian data were mostly taken from a lecture given by the Inspector of Reindeer and Lapps in Norway, Mr. Kristian Nisson, as published in the year book of the Norwegian Geographical Society (Det Norske Geografiske Selskab aarsbek, 1914-15). This pamphlet gives a very good view of the whole Lapp situation in Norway, historical notes about the Lapps, and many other things of value to those who are interested in these people.

The total number of Lapps is not very great. The latest official reports give the following figures: Norway, about 20,000; Sweden, 6,000 to 7,000; Russia, about 1,700; Finland, about 1,500; total, 30,200.

The total here given may, however, be a little low. The whole might be estimated at about 40,000.

There is only a comparatively small percentage of Lapps who live on the reindeer, a large number, especially in Norway, getting their livelihood from agriculture and from fishing.

The agricultural Lapps are probably in most cases descendants of the Nomads, or "reindeer Lapps," who have decided to settle down and do farming instead of nomadizing. There may be several reasons for this, but one is no doubt that in certain districts there has been a lack of food for the reindeer, and consequently it has been easier to make a living, even if very simple and poor, by agriculture. In other cases, the Government or other interested parties have induced the Lapps to settle as agriculturalists, as especially during a certain period of time, it was thought to be very desirable to have the land settled and farmed. In this respect it has often not been realized that agriculture gives a very much smaller revenue than the reindeer service, and thus a part of the population has been induced to live a poor life, without the possibility of utilizing the opportunities of nature. The Swedish Government has, however, always, but especially in the later years, realized the importance of giving the Lapps the protection which makes it possible to continue their original life.

The fishing Lapps, in most cases, originate from the Nomads, having preferred to get their living in a comparatively lazy life as fishers, instead of in the more strenuous life as nomads. In many cases poverty seems to be the real reason for the transition into the fisher's life. It is, however, not improbable that some of the fisher Lapps in Norway have ancestors who came to the country earlier than the Nomads.

If you divide the Lapps into groups, according to their chief livelihood, of reindeer service, agriculture and fishery, you will find that the nomad Lapps, or "reindeer Lapps," are very much fewer than the others.

In Norway there are only about 1,260, or one-sixteenth of the whole number living exclusively on the reindeer.

In Sweden we distinguish between nomad Lapps and forest Lapps; the latter generally live in houses, but at any rate get their livelihood chiefly from reindeer. The reindeer, however, do not migrate as do these belonging to the nomad Lapps. The reindeer of the forest Lapps are a little different from the other, but somewhat larger, and the year around these deer rove about in the neighbouring woods.

The latest statistics are as follows: Sweden-nomad Lapps, 2,791; forest Lapps, 465; total, 3,256. These Lapps live exclusively by the reindeer service. Finland-reindeer Lapps in 1900, about 300. Russia, unknown.

One can, however, with certainty estimate the whole number of nomads in Sweden, Norway, Finland and Russia to be between 5,000 and 6,000.

According to statistics collected during 1911 and 1915, the number of reindeer in Norway was 141,755. In this case calves younger than one year are not counted. Nisson has expressed the opinion, however, that this figure is a little too low, and suggests that there are at least 150,000.

According to statistics made in 1909-11, the number of migrating reindeer, or as they are called "mountain-reindeer," was, in Sweden, 233,177; and forest-reindeer, 41,488; making a total of 274,625.

In Norway the nomad Lapps live chiefly in the northernmost province, Pinmarken; residing in the summer along the coast of the Atlantic ocean, and in the woods nearer the Swedish border in the winter, especially in the two parishes of Koutokcino and Karaajok. Smaller in number are the reindeer herds in the parishes of Palmak and Sydvaranger. Further south there are reindeer Lapps in several sections of Tromsø, Nordlands and Trondhjems amt, but there the number of reindeer is much smaller.

In the southern part of the kingdom a number of efforts have been made to utilize the vast high mountains for reindeer service. The first time, as far as known, about 1,780 in the district called "Hardangervidda." These experiments did not show any good results, but they were renewed again several times later in a number of places in the Kristians amt, and the Buskoro amt. The manner in which these experiments were carried out was generally the forming of small companies by farmers and others owning the herd, sometimes consisting of a couple of thousand animals. Most of these small companies have failed, but after a while new companies have been formed and the business started again. During the years 1880 to 1910, there was great prosperity; the chief reason, however, being that young Lapps were engaged to keep the herds owned by small companies, whose shareholders usually were farmers of the district. During this period the number of reindeer continued to grow, and probably went as high as up to 40,000. Since then, there has been a decline, and the number of reindeer in the southern part of Norway outside of the old reindeer district is at present estimated at about 15,500. The reason for this decline in the reindeer service is supposed by K. Nisson to be that there is not sufficient food; the reindeer moss, which is the chief winter food, occurring in a comparatively small amount. Another very important reason, Nisson says, is that there are numerous wild reindeer in the district, and it is impossible to

keep tame deer where the wild animals are in abundance. The wild reindeer in many ways spoil the tame, and further, very often the antagonism between the hunters and reindeer owners causes great difficulties.

In Sweden the reindeer nomads live in all the parishes along the boundary between Sweden and Norway, from Finland in the north to Idre in the provinces of Darlecarlie—a distance of about 600 English miles, or more than half the whole length of the country.

Lapland, the northernmost of the Swedish provinces, reaches from latitude 64 degrees to nearly 69 degrees, and comprises about one-fourth of the total area of Sweden, which area is about 173,000 square miles. Most of the Lapps live in this province, but even in the provinces Vesterbotton, Jamtland, Harjalon and Darlecarlia there are some Lapps.

In all the provinces the Lapps are, of course, in a great minority; only in one parish, in the northernmost part of Sweden, do they amount to more than half of the whole population.

The mountain Lapps, or nomads, do not live in any particular place, but divide into tribes migrating in certain districts. For instance, in the two northernmost parishes in Sweden, where the Lapps are most numerous, they migrate in the forest region south of the Norwegian border the whole winter; in the spring they move over the frontier and continue slowly down from the high mountains to the Norwegian coast, from where some of the reindeer herds, amounting to many thousands of animals, swim over the fjords out to some of the big islands where they are pastured the whole summer. In the fall they move back to the high mountains, and from there down again to the forest region. The distance which some of the Lapps move twice a year is in certain cases 100 to 150 miles, and in this way they have gone on moving for hundreds or perhaps for thousands of years.

From the southern part of Lapland, the Lapps only move twenty to thirty miles into Norway, but there, and in the provinces south of Lapland, they usually go down into the forest region in Sweden, sometimes as far as to the coast of the Baltic sea. Thus the whole northern half of Sweden is inhabited by migratory Lapps during a part of the year.

The forest Lapps are found chiefly in some small districts situated between the Baltic and up to 100 miles therefrom.

The Nomads, as a rule, live in huts all the year round, moving with the reindeer herds. This, especially in the winter, makes an extremely hard life, but still, it is very healthful. In later years there has been a certain tendency among some of them to build houses or more substantial huts of wood, and to keep their families there. This has a very bad influence upon the reindeer service as well as on the health of the Lapps. It has been observed that tuberculosis is much more prevalent among the families that live in houses than among those who keep to their old mode of living in huts made of cloth.

The Swedish Lapps, however, as mentioned before, have many difficulties to deal with. The farming settlers in Sweden have gradually gone farther north in the district where the Lapps formerly were alone, and as the reindeer sometimes spoil the hay belonging to the farmers, conflicts very often arise in which the Lapps, who commonly are held responsible for the damage, are the sufferers. Still worse is it in Norway, where both the officials and private people to a certain degree work against the Lapps.

At present there is a Swedish Norwegian commission working on the solution of these problems, and trying to establish rules which can make the existence of the Lapps safer. The big mountains along the frontier can not be advantageously utilized by other people than the nomads, and to the whole country the reindeer service is a very important and useful industry.

It is very often said that the Lapps are dying out, but experience does not prove this. Of course, as soon as railways are built through the country and the Lapps get in touch with another kind of culture than their own, some of them will be lost, but as a rule, they try to preserve their own mode of living and to avoid mixing with other people.

The value of the whole reindeer stock was, before the war, estimated at:— for cow, kr. 24; for ox, kr. 33; for calf, kr. 15; for calf born in the year, kr. 10; now the prices are, of course, much higher, and may be estimated in the four groups at 45 to 50, 60 to 80, 25 and 10 crowns, respectively.

The following data about the sale of reindeer meat, hides, hoofs and horns may be interesting:—

The reindeer meat is of course used as food by a great number of people. Many consider it better than cattle meat. The steak is used either fresh, dried, salted or smoked. This is the part of the reindeer meat which is most largely exported to the southern part of the country. Other parts of the animal, *i.e.*, ribs and legs, are generally dried in the air and slightly smoked in the opening of the hut and used by the Lapps themselves. This is an excellent food, very concentrated, and very easy to carry on the long wanderings and travels. It is eaten either dried and cold, or roasted.

The hide, immediately after being taken off the killed animal, is put on wooden stretchers and dried in the open air, and as soon as it is properly dried it can be either sold for export or used for the Lapps' own purposes. It has manifold uses. The Lapps, as well as other people living in the woods in the northern part of Sweden, use it for bedding, and it is for this purpose very adaptable, being very warm and easily transported, the weight of the hides being four to six pounds.

The Lapps themselves, and even the tanners, prepare the hides for making shoes, gloves, etc. In other words, it has the same use as the skin of cattle or calves. It is to a great extent, even exported for such purposes. The hides of the calves, which are killed in the fall, are used by the Lapps, as well as by the settlers in the district, as winter clothing, with the fur on the outer side; these furs are very warm and comfortable. The hair, however, has a great tendency to shed. A fine fur coat of reindeer skin would cost about kr. 60 to kr. 90 (\$16 to \$24). The hides from the head and limbs of the reindeer are used for shoes. The hair is used for a number of purposes and is highly valued as an article of export. It is used for upholstery purposes, and on account of the air channel in each hair, it is also used in large quantities for manufacturing life preservers.

The horns were formerly used mostly for manufacturing glue, but now the large beautiful horns are also used for decorative purposes, and making knife handles and shields for knives, etc.

The sinews from the legs of the reindeer are always saved. When the animal is killed they are taken out and dried, and in this shape they can be kept for a long time. The Lapps are exceedingly clever in making thread of these sinews, which is used for sewing of clothes as well as shoes. They are very strong and stand water very well. They are also exported to a great extent to Norway.

The use of reindeer for transporting purposes is not so great as it was before roads were built in Lapland. Along the Finnish frontier the mail, however, is still, to a certain extent, carried by reindeer between Muonionalusta and Karesuando, a distance of about sixty miles, otherwise the reindeer is used for transporting mail, only when the conditions of the roads are such that horses cannot travel.

As long as the settlement of the forest and mountain districts of northern Sweden had not progressed very far, cattle raising was entirely dependent upon the fodder crops in fields around, and in swamps and brooks, which were often situated far away from the farms. Before the swamps had frozen it was impossible to go over the ground with horses and later in the winter the deep snow made it impossible to bring anything home from the meadows. With the reindeer one can get over the ground as soon as there is snow on the ground, and for this reason the reindeer was the only suitable animal for transporting purposes.

The abundant supply of reindeer moss furnishes these animals with plenty of fodder around the farms without any expenses or trouble for the owners. On the other hand, the fodder supply for horses around the farms was often very scarce, and this constituted another obstacle, the more so as one had very little other use for horses. Besides the bringing home of fodder, one can also use the reindeer to convey food supplies from the trading centres and for the transport of game and fish and reindeer meat, which are the chief nutriment in these districts. Further, the reindeer were used to a large degree for the transport of goods from the coast cities to the market places in the interior of the country. In the beginning of the last century, iron ore was also transported by reindeer from the mines of Lapland to the furnaces along the coast.

When the lumber industry was started on a large scale up in the river valleys, and the roads to the river where the timber was floated were not completed, reindeer were largely used for transport purposes, especially in certain parts of Norrbottenslan.

As the settling continued and the number of people increased, the game and fish decreased. The settlers were, therefore, obliged to engage in a little more intensive farming and the keeping of horses became a necessity.

At the same time the abundance of reindeer moss around the meadows and farms also began to diminish, due to forest fires, increase in reindeer, the use of the moss as fodder for the cattle and other similar causes. As a result, the use of reindeer for transport has become less and less prevalent, and they are now used with the exception of those used by the nomad Lapps on their wanderings, only on the more distant farm land for sending the products of the reindeer industry to the town where they are sold.

APPENDIX No. XIII

REINDEER IN NORTHERN EUROPE

Memorandum prepared from letter addressed to the Commission by Captain A. Allanach.

Re REINDEER—

I give you below some of the details I gathered whilst in the Arctic regions which I trust will be of interest to the Commission enquiring into this matter.

There are two questions which have arisen in my mind with regard to this reindeer question since my last letter, the first being that of the wild reindeer, purely for the quality and quantity of extra meat production, and the second that of domesticated reindeer and their usefulness for packing and transport purposes whilst snow is on the ground.

Cost.—The prices asked by the Finnish owners at the time of my visit last March and April, was 500 marks each. The marks at that time were worth 40 to the English sovereign, but as the Finnish exchange is now about 60 to the pound, the cost at the present time of reindeer f.o.b. Bugo Fjord or Kirkenes, both in northern Norway, would be about £9 each, *i.e.* about \$40 to \$50 each.

A resume of my work in connection with the reconnaissance in northern Finland will, no doubt, give you much information with regard to the habits etc., of these animals.

Owing to the gulf stream flowing around the most northerly point of Norway, it is possible to sail from Bergen on a daily steamer to Vadso and Kirkenes, the latter place usually having a channel for the boats to get in and out even in the depth of winter. I disembarked at the end of March at Vadso, and was taken across the Veranger Fjord to Bugo Fjord. This latter place, together with Kirkenes, are the winter trade routes for the reindeer trains from the middle of northern Finland to the seaboard, and either one or the other of these places would be the most suitable place from which to ship the reindeer. In the summer it would be a comparatively short journey direct from northern Norway across the Arctic sea to the Hudson bay. The packer and guide of a reindeer train is called a vapoose, and the sleigh which one rides in is a sort of half canoe, with prow in front and runner underneath. This is called a pulka. The reindeer are driven in single file, the vapoose going in front and the other following. I have a large number of photographs of the trip which I shall be pleased to forward to you from England if you consider same would be useful.

Practically everything in connection with reindeer driving is utilized from the reindeer itself. The halter round the reindeer's neck is made of reindeer leather, and this is attached immediately in front of the animal's forelegs with a cross piece made from reindeer horns, to this is then attached a piece of reindeer leather, about three inches in diameter and four feet long, and this is fastened to the prow of the pulka. This passes under the animal's belly between its fore and hind legs.

The reindeer utilized for trail work are male and female and they are altered for domestic use. They weigh from about 80 to 100 pounds and can pull at least six times their own weight for about ten hours per day. They cannot stand any weight whatever upon their backs.

I drove about 500 miles behind the reindeer, three lots of reindeer being provided at various places. This was owing to the fact that we were able to work twenty hours per day, owing to the sun shining for twenty hours. This country I was in was all in the Arctic circle, and a week or two after I left the sun would be shining for twenty-four hours for three months.

Horns.—The reindeer all cast their horns yearly, this taking place in the spring, about March or April. Their enemy the wolf is naturally busy about this period, and we lost one of ours which had cast its horns one night whilst on this trip. The Finlanders and Laplanders collect these horns, and prior to the war they were mostly sent to Germany for souvenirs, and were also utilized in the making of buttons, etc. The Norwegians are now utilizing them for various purposes, and the Laplanders appear to get a good revenue from the same.

Food of Reindeer.—The sphagnum moss grows in abundance and is their sole food. Unless they get this they die, and it must be very well provided for them if they should decide to try a herd on this side. In order to save time for the domestic reindeer the peasants stock large quantities of this moss on the main reindeer trails and this obviates the reindeer having to dig out its own food when it has been running all day. I never saw them drink water, as they always ate the snow when they were thirsty.

Owners, etc.—I was met in the interior of northern Finland by Captain Suverenni, of Ivalo, North Finland, who is a Captain in the White Guards against the Bolshevik, and he speaks and writes English very well.

The Food Controller in this northern district inland is Mr. Kangasniemi, of Inair, North Finland.

Other owners of reindeer are: Enok Gunnari, Bugo Fjord, via Vadso, Northern Norway; Knut Evanger, Vadso, Northern Norway; John Berg, British Vice-Consul, Svolvar, Norway. Kangasnieme, Gunnari, Evanger and Berg are all associated in the same trading companies, and as I am in negotiation with them at the present time with regard to fur and lumber, I have mentioned the matter of the reindeer to them and expect to give you later definite information as to the quantity there are available, cost, hire of vapoose, and if they could quote a price for a herd delivered to Southampton island, Hudson bay, next summer.

Vapoose.—The vapoose who look after about ten reindeer when on the trail are in receipt of about \$5 per day in their own country, and I have no doubt that some of them would willingly exchange the filthy conditions of life in Lapland for a good living wage in Northern Canada. Some of the vapoose I met had been to various European countries at exhibitions, and they realized that they were far better off financially out of their own country, and with the added knowledge that they would be upon work which they had been at since their childhood, I have no doubt that arrangements could be made with the shipper of the reindeer to provide the necessary men for the pack.

The Meat.—The meat is practically the same as your own venison. The tongues are considered a great delicacy, are usually cooked and sold at a high figure.

Re Hides, Skins, etc.—The skins of the younger animals are the ones mostly used for the making of their trousers, pesks (which is the name for their overcoats, this has hole to slip head and arms through), and moccasins.

The older animals are very much infested with the blow-fly, which secretes itself under the hair and comes out in the summer. This usually causes the hair to come out in large patches when same is made into rugs. Dr. Rutherford is well acquainted with this fly, and after his interesting explanation to me in Ottawa, upon the way in which this fly works, I am sure it is needless for me to add further remarks in this connection.

Good reindeer skins are selling for about £2, about \$10 each. Some of the young skins without traces of the fly were sold for double this, for the making of clothing.

Breeding.—From my own observations they appear to have three or four calves, and the herds are collected in the fall and branded, and either killed or altered according to the owners' requirements.

Age.—Some of the ones we were driving were about eight years old, but they commence to drive them at two years old. From my own observations, I would not consider that the altering of these animals causes them to grow to large size, as the wild ones I came across seem to be the larger type.

Temperature.—The weather where these reindeer are goes down to as low as 60 below zero in the winter, and there was between four and six feet of packed snow when I was there. In the summer it is just as warm, and the reindeer are then turned loose and collected again in the fall.

I trust this information will be useful to you, and if there are any queries in regard to same which arise in your mind, I shall be glad to hear from you.

My address, from about the middle of November until about the end, will be care of Chateau Laurier, Ottawa, and I shall have pleasure in calling upon you during that period.

Yours faithfully,

(Sgd.) A. ALLANACH,
Captain.

APPENDIX No. XIV

REINDEER IN SIBERIA

Excerpts from submissions of Commodore B. P. Bertholf, formerly Commander of United States Coast Guard Service in Bering Sea.

Commodore Bertholf first went to the Bering sea in 1897, as one of the officers in charge of the Government schooner *Bear*, which was sent to the rescue of whalers at Point Barrow.

He was a member of the overland expedition, which was separate from the party which accompanied the deer from Cape Prince of Wales to Point Barrow, and could, therefore, give but little information regarding the handling of the deer on this particular expedition overland.

With regard to the deer purchased by him for the United States Government at Ola, he states:—

“Dr. Jackson, being thoroughly convinced that the plan of establishing domestic reindeer herds in Alaska was successful, turned his mind to improving the breed. Having learned that in the neighbourhood of the Okhotsk sea there was a larger and hardier breed of reindeer than those usually met with on the northeast coast of Siberia, he suggested that I should go to that region to investigate, and if possible purchase some of the larger deer.

“It was believed that better time could be made by travelling to the Okhotsk sea overland in winter, rather than going by sea in the summer and waiting for the country to become passable. Consequently, I journeyed to Ola by way of St. Petersburg, Moscow and Irkutsk. From there we travelled by horse-post down the Lena river to Yakutsk; from there over the divide to Okhotsk by horse, reindeer and dog-post. Leaving Yakutsk, the first portion of the post route was travelled by means of horses. Then we changed to reindeer until about fifty miles from Okhotsk, and from there along the coast of the Okhotsk sea to Ola by dog post.

“Arriving at Ola, which is a small Tunguska village, couriers were sent out to the large deermen in the vicinity to come to town at my request. After several conferences, arrangements were made to purchase 400 or 600 deer, and to have them driven to the immediate vicinity of Ola in the spring, as soon as the mail steamers began to run. We constructed corrals for the rapid hobbling of the deer, and collected sufficient moss to feed the deer while on board steamer. I proceeded to Vladivostok and chartered the steamer *Progress*, returned to Ola and took the deer aboard, also the moss, and transported them to Port Clarence. The deer purchased were very young, mostly females, and the horns, of course, were in the velvet. We had bad weather for the trip from Ola to Port Clarence and many of the deer died, so that if my memory serves me, we arrived at Port Clarence with about 250 head. These deer were purchased with cash as the natives in that part of Siberia understand modern ways of trading. We paid ten rubles a piece for the deer, which was a good price from the native standpoint.”

In regard to the comparative advantages and merits of dog and reindeer travel in Siberia, Commodore Bertholf stated:—

“A traveller in Siberia and Alaska would notice a very radical difference between the two countries. In Siberia, the great objective appears to be speed, while in Alaska, the great objective appears to be the amount of weight that can be carried. In Siberia they had, at the time I travelled, well understood regulations as to the amount that could be put on either a dog sled or a deer sled, and we were charged so much per sled on the basis of the weight assigned to the sled. Whenever the road was unfavourable the owners of the deer or dogs would always furnish more sleds and more deer or dogs without additional cost, in order to lighten the load of each sled. On the other hand, in Alaska sleds were always loaded to the utmost capacity of the animals, and this necessitated some one to push behind the sled and someone else to go ahead of the dogs to break trail. In Siberia along the post routes no one ever walks. The driver sits on the sled with the passenger when either reindeer or dogs are used, even where there is no road. The dogs are given their directions by word of mouth from the driver. The reindeer are directed by a line attached to the horns. In addition to the forgoing, it is of interest to note that a driver of a dog team always carries a very stout staff, iron shod, which he not infrequently uses to stop the dogs going too fast, either down hill or when they get wind of some animal they desire to chase.

“The natives had practically no market for their deer so far as I know. There was somewhat of a market for deer skins, practically those of the younger deer. Ola at that time was the sea terminal of a caravan route into the Kolyma river country. During the summer supplies which the Government wanted to send into the Kolyma country were brought to Ola by steamer and stored in warehouses. In the winter when the snow travel has become settled, all these supplies are freighted into the Kolyma country by means of deer. Each summer the deermen would come to Ola and arrange with the Government agent for the number of deer they would furnish for the winter transportation. The caravans began operations usually about Christmas time. Formerly all these supplies for the Kolyma country were freighted down the Lena river, but the deer caravans were found more advantageous and less expensive.

“It is most interesting to note the reliability of these deermen. In the summer when the agreements are made at Ola for the deermen to transport the supplies in winter, they are paid in cash a certain portion of the freight money, and then they disappear into the deer country. There is no way to hold these men, beyond their word, but they have never failed to turn up at Ola with the outfit of deer according to agreement. Whenever a particular man has lost his deer or has died, some relative will be there in his place to fulfil the agreement.

“If the conditions as to the deer herds have not materially changed since 1901, I think there would be no difficulty in purchasing the deer from these people, providing there is no interference of prohibition on the part of the laws of the country. After we had purchased the deer at Ola, the Czar's government forbade the further sale of reindeer for exportation. I have always surmised that the prohibition was issued

through ignorance of the country and conditions. When I was at St. Petersburg, arranging for the trip to Ola, I was astonished at the apparent lack of information at the Government's disposal regarding reindeer matters in Siberia. It was impossible to find out where the deer were or the number of deer, and I got the impression that the officials didn't much care. However, when it dawned upon the officials that somebody in another country wanted these deer, the animals immediately became more valuable, and that, I think, was the main reason for the order of prohibition.

"The moss to feed the deer on the trip was gathered by hand. I employed a number of coast Tungus to gather it on the hills, bring it in and stack it in piles, and in the spring we bagged it. It was all gathered by hand and brought in to the moss piles on the reindeer's backs. We simply had the moss gathered and collected in large piles near the coast, in order to be quickly available for transportation. All we did was to turn the moss piles over at intervals in the hope of preventing fire—spontaneous combustion. I doubt very much if it is difficult to preserve the moss. Always in transporting the deer from Siberia to Alaska, either on the old revenue cutters or on the ship I chartered, we simply gathered the moss and transported it in bags until we used it. We usually built troughs into which the moss would be dumped, and then water was poured over it, because by the time the moss was given to the deer it was rather dry. But the deer seemed to eat it with a relish.

"If I had the same thing to do over again I would buy older deer, say two years old, and I would endeavour to transport them by sea as late in the season as possible. In other words, I think it would be wisest, in carrying reindeer any distance by sea, to be as far as possible from the time of the growth of the new horns.

"All of the other deer taken to Alaska for breeding purposes were obtained from the northeastern coast of Siberia, mostly Chukchi deer. One small lot was brought from Baron Korfa bay—Koriak deer. The Tungus deer are in the vicinity of the Othotsk sea. They are much larger and sturdier and have longer legs than the deer of the northeast coast of Siberia. I believe the interior Chukchi and those some distance to the west of East cape have deer which are larger than those on the coast, but I believe that the Tungus deer are larger still. My own experience with transporting deer was as I have described above, and there was a large percentage of deaths. On the other hand, sled deer were brought into the country from Norway, which involved the voyage across the Atlantic, then a railroad trip across the continent, and a further trip by sea and land to Haynes Mission in Alaska. If I remember rightly, there was not a single death. Of course, the deer brought from Norway were sled deer and were brought at the season of the year when the horns were hard. The deer I brought from Ola were younger and were transported at the time when the horns were in velvet. Bearing in mind that some five hundred deer were brought all the way from Norway to Alaska, there would seem to be no reason why they could not be brought from Siberia to the Hudson bay region, which would not be a much greater distance in point of travel.

"If you wanted to get the Koriak deer, they could be gotten quite late in the season at Baron Korfa bay, on the east coast of Kamchatka. They are smaller deer, however. Then, too, it might not be impossible

to drive a herd of deer from Ola over to the Kamchatka coast, where they could be embarked much more readily than at Ola, and later in the season.

"When I was in Alaska there was no prejudice among the white men against reindeer meat. Everybody was glad to get it. It had never occurred to me that anybody would dislike reindeer meat until I heard Captain Baylis say so the other day. But that appears to be on all fours with the fact that some people do not like chicken and some do not like fish. In fact, Captain Baylis mentioned that he never ate wild duck for he does not care for the taste.

"In Siberia, along the post roads we had reindeer meat for food, when we wanted it, and had time enough to get it, but when you are travelling rapidly in Siberia you carry as little food as possible, and make it as light as possible. It is the custom in Siberia in preparing for a long trip to cook up meat and make a thick, heavy soup. The soup is then strained and frozen in cakes about the size of a brick. The meat remaining is rolled in small balls, about the size of a hickory nut, and then rolled in dough, which gives you something about the size of a walnut. This is also frozen, and all you need when travelling is a sack full of these frozen meat balls and another sack full of soup bricks and some tea. That can be stored away anywhere on the sled, and it is always handy. In having these things prepared at the various towns there was no deer meat available, so most of it was beef, but as we got to the coast we had deer meat at Okhotsk and at Ola. I was, of course, glad to get it. That was the cleverest way of travelling I ever saw.

"I am very fond of reindeer meat. I have always looked upon reindeer meat as a luxury, possibly because I don't often get it. But the flavour of reindeer meat is very good, particularly when it is fresh. Personally, I don't like venison of any kind, and when I speak of venison I mean meat which is a bit strong. It has never struck me that reindeer meat was venison. I have eaten reindeer meat which was on the order of "venison," but that was because it was old, and I ate it only from necessity. In other words, I have always considered venison as so much spoiled meat, just the same as if beef were treated the same way. Reindeer tongues I think are particularly fine, dried and smoked. I have eaten reindeer meat in the summer and in the winter, both in Alaska and Siberia, and I have never noticed any difference. I liked it at all times, particularly if it is young deer.

"If the reindeer industry comes to be a paying one in Alaska, white men will want to go into it on the same basis as cattle raising in Montana and I should think it would be a very attractive proposition. That country in the past supported tremendous herds of caribou, according to the annals of the early explorers, and, therefore, it can support as many herds of domestic caribou at the present time.

"I think it is only in the northern part of Alaska that the climate is worse than in the Dakotas in the winter time. Certainly it can't be a very dreadful country, when you can pick huckleberries a hundred miles north of the Arctic circle, and cut lettuce three times in the season a hundred miles south of the circle.

"I should put the old timers in Alaska in two or three classes. Most of them were there because they like it; some of them went there originally because they thought they could make a better living than they

could in the States; and some were there from the spirit of adventure. But I think the number that might be classed as having left their own country for the country's good is a very small percentage. My experience has been that white men who go to Alaska and spend a year there will always want to go again. I think the outdoor life and freedom from conventions is a great attraction to many people. It is the fascinating prospect of a new frontier that appeals to me. We no longer have a western frontier, but we have a northern frontier. The same type of men that made the west will make the north in somewhat the same way.

"I think the chances of success in Alaska will be increased by having in the country a food-producing industry. Certainly the inhabitants of Nome congratulated themselves when they were able to get fresh meat in the shape of reindeer, rather than to wait for it to be shipped in by refrigerator ships from the States. I don't think the deermen of Alaska have ever had any difficulty in disposing of their carcasses.

"I have sat on a reindeer to see if he could carry me. At that time I weighed 200 pounds. He could, and did, carry me for some little distance very readily. The deer are used by the Tungus as beasts of burden and also for transportation deer-back. I have seen the deer trotting with a man on his back. I have known the Tungus to travel deer-back for ten or fifteen miles—men weighing perhaps 150 or 160 pounds. How much more they can carry I do not know. You probably wouldn't find the deermen in Siberia loading the deer with heavy packs. I think you would find the packs exceedingly light, on the same principle as they keep the sleds exceedingly light. They would rather use more deer and less weight in the pack."

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